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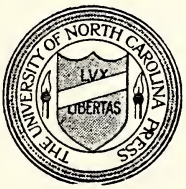

RESEARCH IN PROGRESS

JULY, 1928-JULY, 1929

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RESEARCH IN PROGRESS

JULY, 1928—JULY, 1929

RESEARCH IN PROGRESS, now in its ninth volume, contains a record of the research work conducted by the faculty and graduate students of the University of North Carolina in the year ending July 1, 1929. Abstracts of important scholarly papers, books, and monographs will be found listed under the department in which the work was done. Abstracts of doctoral dissertations and masters' theses also appear under the department concerned.

The interest which has been manifested in this volume during the past years makes it a pleasure to bring together the present issue.

JAMES F. ROYSTER, *Dean.*

APPROPRIATIONS GRANTED FROM THE SMITH RESEARCH FUND AND THE FACULTY RESEARCH FUND

PROJECT NUMBER	APPLICANT	SUBJECT	AMOUNT
95	Taylor, W. F.	Traveling expenses to the Library of Congress	$ 35.00
96	Harrer, G. A.	Photostating in the Library of Congress	20.00
97	Caldwell, W. E.	Purchase of books dealing with the history of Alexandria	20.00
98	Royster, J. F.	Photostating the title-pages of Elizabethan plays	100.00
99	Fenley, G. W.	Traveling expenses to New York libraries for work in connection with the *Roman de la Rose*	55.00
100	MacNider, W. deB.	Preparing of microphotographs	35.00
101	Murchison, C. T.	Work on a study of the textile industry	55.00
102	MacNider, W. deB.	Photostat prints	4.20
103	McCain, J. W., Jr.	Work in the British Museum on doctoral dissertation	75.00
104	MacNider, W. deB.	Technical work in connection with research projects	70.00
105	Elliott, Van C.	Photostating of a newly discovered Latin inscription	25.00
106	Metzenthin, E. C.	Photostating portions of the MS of the *Heliand*	25.00
107	Stoudemire, S. A.	Traveling expenses to the New York Public Library	60.00
108	Hickerson, T. F.	Technical work on research problem concerned with continuous beams and columns	50.00
109	Holmes, U. T.	Photostating and purchase of books in connection with an edition of Du Bartas	100.00
110	Park, J. G.	Purchase of 300 grams of amino-cymene	33.00
111	Williams, W. W.	Purchase of 200 grams of amino-cymene	22.00
112	Adams, N. B.	Traveling expenses to Spain for study in libraries	200.00
113	MacMillan, W. D.	Traveling expenses to Washington and New York for work on eighteenth-century plays	60.00
114	Leavitt, S. E.	Salary for assistant in work on Lope de Vega	100.00
115	Chesley, E.	Salary for a reader in the British Museum	50.00
116	Pierson, W. W.	Photostating in connection with work in Spanish-American history	10.00
117	Couch, J. N.	Traveling expenses to Boston for the purpose of studying *Septobasidium*	75.00
118	Bost, R. W.	Purchase of chemicals for the synthesis of the thiophanes	50.00

APPROPRIATIONS GRANTED FROM THE SMITH RESEARCH FUND AND THE FACULTY RESEARCH FUND (Continued)

PROJECT NUMBER	APPLICANT	SUBJECT	AMOUNT
119	Plyler, E. K.	Traveling expenses to the University of Michigan for completion of studies in the absorption measurements of water vapor	$100.00
120	Stevenson, H. A.	Traveling expenses to Harvard and Yale universities for the study of the scientific background of the Elizabethans, also Photostating	75.00
121	Green, F. M.	Traveling expenses, photostating, typing, and purchase of books for a study of the life of General Duff Green.	250.00
122	Abbot, W. R.	Copying of title-pages and verifications of translations of Du Bartas in the British Museum and the Huntington Library	75.00
123	Posey, J. W.	Traveling expenses to the Library of Congress for a study of Tasso in English translation	40.00
124	Barker, M. I.	Traveling expenses to Europe for work on Stendhal	200.00
125	Pierson, W. W.	Copying of manuscript documents in Latin America	100.00
126	Frazer, K. C.	Traveling expenses for work in Library of Congress and the University of Michigan	50.00
127	Mattox, W. J.	Purchase of chemicals	25.00
128	Williams, W. W.	Purchase of chemicals	20.00

DEPARTMENT OF ANATOMY

W. C. George (with Dr. W. E. Hoy, Jr.) published during the past year:

The Somatic Chromosomes of the Opossum. *Jour. Morph. and Physiol.*, XLVII: 1: 201-225. For abstract see *Research in Progress,* 1927-1928, p. 7.

Professor George has in press:

The Histology of the Blood of Some Bermuda Ascidians.

The structure of the living blood cells is described and the cells in the following species of ascidians are classified: *Phallusia nigra, Ecteinascidia turbinata, Clavelina oblongata, Symplegma viride.* Evidence for the genetic relationship of the various types of cells is discussed.

Further Observations on Ascidian Blood.

The blood cells are described and classified and observations recorded concerning some of their reactions in two species of ascidians: *Phallusia hygomiana* and *Styela plicata.*

Professor George has under way a study of the blood of Balanoglossus.

Professor George and Dr. W. E. Hoy, Jr. (of the University of South Carolina) have under way a study of the cytological changes that occur in amphibian blood prior to metamorphosis.

DEPARTMENT OF BACTERIOLOGY

D. A. MacPherson has completed the following investigations during the year:

Studies on the Metabolism of the Streptococci. I. The Production of Amylase and Caseinase by Streptococci. (Accepted for publication in the *Journal of Infectious Diseases.*) (This study was aided by the Rockefeller Grant for Research.)

Both hemolytic and green producing streptococci, whether grown aerobically or anaerobically, produce an amylase which utilizes equally well several different starches. The presence of simpler carbohydrates has an inhibitory effect upon the production of amylase. It is possible that starch fermentation may differentiate certain pathogenic streptococci, particularly erysipelas streptococci. Quantitative determination of the starch hydrolysis shows that while considerable sugar is produced there is never an appreciable amount of excess

sugar in the culture. The hemolytic streptococci differed from the green producing ones in elaborating caseinase. Quantitatively the hydrolysis is small in amount, and is not inhibited by the presence of carbohydrates.

Studies on the Metabolism of the Streptococci. II. Streptococcus Suspension Lysin and Some of its Properties. (Accepted for publication in the *Journal of Infectious Diseases.*) (This study was aided by the Rockefeller Grant for Research.)

The supernatant obtained by centrifuging a salt solution suspension of hemolytic streptococci from blood agar has a surprising hemolytic potency which reaches a maximum after six to twelve hours incubation. This lysin appears to be extracellular and preformed on the surface of the solid medium. The resuspended, washed bacteria and the intracellular substance of the streptococci fail to produce hemolysis. Fermentable carbohydrates inhibit the formation of the lysin, but have no effect on it once formed. The activity of the lysin is not due to acid. A lysin produced on sheep blood agar is active against the red cells of other species. Rabbits injected with the active lysin show no ill effects, and fail to develop an antilysin. This lysin represents a purer hemolysin than that generally obtained. It was not possible to crystallize the lysin. It is suggested that this method may produce a purer form of scarlet fever streptococcus toxin than that now used in determining susceptibility to this disease.

The Determination of Amino Nitrogen in Bacteriological Media. (With F. P. BROOKS.) (To appear in the July issue of the *Journal of Laboratory and Clinical Medicine.*)

A comparative study of the available methods for the determination of amino nitrogen in bacteriological media indicates that both the Folin and Van Slyke methods give accurate results when certain precautions are taken.

DEPARTMENT OF BOTANY

W. C. COKER has published during the year the following:

The Distribution of Venus' Fly Trap *(Dionaea muscipula). Journal of the Elisha Mitchell Scientific Society,* XLIII: 221, pl. 33. 1928.

This article extends the published range of the plant to include the territory between Newbern in North Carolina and Murrell's Inlet in South Carolina, and westward to Lakeview, which is thirty miles west of Fayetteville in North Carolina.

Notes on Basidiomycetes. *Journal Elisha Mitchell Scientific Society,* XLIII: 233, pls. 36, 37, 47, 48. 1928.

This includes notes on fifteen species of Basidiomycetes. *Exidia minutissima* and *Eichleriella pulvinata* are described as new; *Saccoblastia ovispora* Möller var. *caroliniana* Coker is raised to specific rank as *Saccoblastia caroliniana* n. sp.; and *Sirobasidium sanguineum* Lager. & Pat. is reported from the North American continent for the first time.

The Chapel Hill Species of the Genus *Psalliota*. *Journal of the Elisha Mitchell Scientific Society,* XLIII: 243, pls. 38-46 and 48. 1928.

Eight species and one variety are described, no one of which is new.

JOHN N. COUCH has published the following:

A Monograph of Septobasidium—Part I. Jamaican Species. *Journal of the Elisha Mitchell Scientific Society,* XLIV: 242, pls. 10-25. 1929.

The introduction takes up the biology of the genus and discusses the highly specialized type of parasitism shown by the fungus, and the mutual relationships among the fungus, the scale insects, and the tree or shrub. Then follows a description of the genus, a key, and descriptions of nine species. Seven of these species, *S. areolatum, S. papyraceum, S. atropunctum, S. alveolatum, S. Polypodii, S. purpureum,* and *Helicobasidium arboreum,* are described as new. Eleven of the plates show microscopic details.

VELMA DARE MATTHEWS has published during the year the following:

Nowakowskiella and a New Species of *Pythium*. *Journal of the Elisha Mitchell Scientific Society,* XLIII: 229, pls. 34, 35. 1928.

Nowakowskiella elegans, which is one of the Cladochytriaceae, is reported from soil collected at Elizabeth City, North Carolina. This has not been reported heretofore from America. *Pythium papillatum* n. sp. is described from Chapel Hill soil.

MISS MATTHEWS gave the following talk before the North Carolina Academy of Science, May 11, 1929:

A Chapel Hill Species of *Pythium* Related to *Pythium splendens.*

A new species of *Pythium* isolated from Chapel Hill soil was described. This species is saprophytic in the soil and seems most closely related to *Pythium splendens* Braun.

Kenneth B. Raper has published during the year the following:

Studies on the Frequency of Water Molds in the Soil. *Journal of the Elisha Mitchell Scientific Society,* XLIV: 133. 1928.

Tables are given representing the results of six series of collections made to test the number of species occurring in a given area. Another table shows the actual number of individual water molds that could be isolated from a given cubic centimeter of earth.

Rebecca Ward gave the following talk before the North Carolina Academy of Science, May 11, 1929:

Observations on the Shrubby Buckeye of Chapel Hill.

A shrubby buckeye, ranging from four to six feet in height, was described. This form differs from *Aesculus octandra* mainly in being propagated by underground runners so that colonies are formed, in being polygamo-dioecious, and in having excluded stamens, larger flowers, and smaller fruits. The corolla shows two distinct colors, the common and typical being yellow to greenish yellow, the less common being Etruscan red. The red form occurs as a seedling from the yellow-flowered plant.

DEPARTMENT OF CHEMISTRY

R. W. Bost (Doctoral Dissertation. June, 1928). Para-Cymene Studies X. Para-cymylene-2,5-diamine, and Certain New Dyes. *Journal of the American Chemical Society,* L: 3106. Nov., 1928. (Under the direction of Alvin S. Wheeler.)

Abstract in *Research in Progress,* 1927-1928, p. 10.

R. D. Norton (Rockefeller Research Assistant). Diketones I. The Reaction between 4-Phenylsemicarbazide and Acetylacetone. *Journal of the American Chemical Society,* L: 2488. Sept., 1928. (Under the direction of Alvin S. Wheeler.)

Abstract in *Research in Progress,* 1927-1928, p. 13.

R. E. Thomas (Master's Thesis, 1928). 4-Amino-5-bromo-1,3-dimethylbenzene. *Journal of the American Chemical Society,* L: 2286. Aug., 1928. (Under the direction of Alvin S. Wheeler.)

Abstract in *Research in Progress,* 1927-1928, p. 13.

Correction:

In *Research in Progress,* 1927-1928, p. 18, it is stated that the work of Gladys Morgan was under the direction of F. C. Vilbrandt. This should read "Under the direction of Alvin S. Wheeler."

DAVID RAMSEY ERGLE. The Bromination of 1,5-Dihydroxynaphthalene. (Under the direction of ALVIN S. WHEELER.)

The substitution of bromine in the benzene nuclei of 1, 5-dihydroxynaphthalene was effected by the action of bromine in cold glacial acetic acid. The same substitution takes place when hot acetic acid is used, but the products are very impure on account of partial oxidation.

Dibromo-1, 5-dihydroxynaphthalene is obtained when a small excess of two moles of bromine is used. The yield is good and the product is of high purity. It crystallizes in well-shaped colorless needles which do not melt below 300°. It was characterized by preparing derivatives, using acetylation, methylation, ethylation, benzoylation, nitration, and oxidation. The nitration at room temperature split off both bromine atoms, substituting nitro groups. Oxidation gave a quinone which is isomeric with 2, 3-dibromo-5-hydroxy-1, 4-naphthoquinone first described by Wheeler and Naiman.

Tribromo-1, 5-dihydroxynaphthalene was prepared by using some excess of three moles of bromine. The yield was very good but the purity only moderate. It was recrystallized from glacial acetic acid in the presence of charcoal. Colorless needles which melt with decomposition at 189°. Derivatives were prepared by acetylation, methylation, benzoylation, nitration, and oxidation. Nitration substituted nitro groups for the bromine atoms. Oxidation gave a quinone isomeric with tribromojuglone prepared by Wheeler and Scott.

FRANK C. VILBRANDT and ANDREW MURPHY. Fertilizer Value of Some North Carolina Shales. Economic Paper, Department of Conservation and Development, State of North Carolina, Raleigh, N. C.

An investigation of the non-oil bearing shales of the Dan and the Deep River valleys for nitrogen, phosphorus, and potash content to determine the validity of claims made by agriculturists that increased crop growth and crop yields resulted after application on soil with several of the shales. Fifteen shales from as many formations were studied, showing nitrogen values ranging from 0.30 per cent to 1.00 per cent, calculated as ammonia; a phosphorus content calculated as P_2O_5, varying from 0.26 in the abundant shales to 7.20 per cent in the lesser quantity shales; the potash values were low. Grinding characteristics, availability of deposits, and the economic values of each shale were discussed in the paper.

FRANK C. VILBRANDT and W. B. SELLARS. Mercerization of Cotton with Sulfuric Acid. *American Dyestuffs Reporter*, XVII: 645, 685. 1928.

For abstract see *Research in Progress*, 1927-1928, p. 19.

FRANK C. VILBRANDT and R. F. ABERNETHY. Utilization of Shrimp Waste. *U. S. Department of Agriculture, Bureau of Fisheries Bulletin,* 1929.

An economic study of the treatment of shrimp waste was made in Brunswick, Georgia, for the purpose of converting the enormous waste from shrimp into animal feedstuffs. Variation of chemicals, concentration of chemicals, methods of cooking, pretreating, drying, and grinding studies were followed by chemical analysis to note progress of change during the various treatments. Methods of treatment were developed for the preparation of three distinct feedstuffs.

Isolation studies indicated the glands which provided the source of iodine in the waste and also indicated from what parts of the body of the shrimp the oil came. A high yield of pure casein was recovered from the waste cook liquors from shrimp processing.

FRANK C. VILBRANDT and others. Vitamine Value of Shrimp Oil and other Shrimp Waste.

The presence of large quantities of cholesterol in shrimp oil, which was discovered in this laboratory by R. F. Abernethy and F. C. Vilbrandt, necessitates a study on the antirachitic properties of the raw oil and the oil treated with ultra-violet light. Animal feeding studies are in progress.

The isolation of the iodine-bearing glands in the shrimp in this laboratory has led to the investigation of the effects of feeding of these glands on white rats. Dr. F. P. Brooks is coöperating in the above studies.

ROY F. ABERNETHY (Progress on Master's Thesis). The Composition of Shrimp Oil. (Under the direction of FRANK C. VILBRANDT.)

The identification and determination of the hitherto unknown shrimp oil has resulted in the discovery of the presence of 15 per cent of easily recoverable cholesterol and the isolation of three other bodies. Identification and analysis of constituent components of the oil are in progress.

R. M. BYRD (Progress on Doctoral Dissertation). The Pressure Factor in Alkali Mercerization. (Under the direction of FRANK C. VILBRANDT.)

Pressure equipment, color tests, testing equipment, and concentration studies on the effect of alkali on standard staple spun cotton have been determined and pressure studies are in process of investigation.

J. H. MOURANE (Progress on Doctoral Dissertation). Factors in Oleo-resinous Combinations and Mixtures. (Under the direction of FRANK C. VILBRANDT.)

The temperature, concentration, and oxidation factors on linseed oil and various natural resins have been studied and their influence determined; the resistance to ultra-violet light, and combinations of weathering, temperature, and time effects on resistivity to abrasion and deterioration of above mixtures are in process of investigation.

PROFESSOR VILBRANDT presented the following papers:

Composition of Shrimp Oil. North Carolina Section of the American Chemical Society, Greensboro, N. C., May 11, 1929.

Mixing Studies of Highly Ionizable Salts in Non-viscous Media. North Carolina Section of the American Chemical Society, Greensboro, N. C., May 11, 1929.

PROFESSOR VILBRANDT has the following investigations under way:

1. Hydrogenation of North Carolina Coal.
2. Unsaturation of Mineral Oils.
3. Pollucite Extraction.
4. Methanol Synthesis.
5. Power Factors in Mixing Equipment.
6. Fluid Flow in Vertical Transportation of Liquids.
7. Sectional and Seasonal Influence on Composition of Cottonseed Oil.

F. K. CAMERON has published:

Lithium Chloride Ammonia Complexes. (With S. C. COLLINS.) *Journal of Physical Chemistry,* XXXII: 1705-1716. November, 1928.

Solid Solutions of Lime and Arsenic Acid. (With A. T. CLIFFORD.) *Industrial and Engineering Chemistry,* XXI: 1: 69. January, 1929.

The Solubility of the Phosphates of Lime in Aqueous Solutions of Sulphur Dioxides. (With W. M. MEBANE and J. T. DOBBINS.) *Journal of Physical Chemistry,* XXXIII: 961. July, 1929.

FRANK K. CAMERON and HORACE D. CROCKFORD. The Aqueous Solutions of Cupric and Ferrous Sulphates. *Journal of Physical Chemistry,* XXXIII: 709-716. May, 1929.

The systematic study of systems containing the sulphates of iron in addition to copper sulphate, sulphuric acid and water is being continued. Three sets of isomers have been determined during the past year in which ferric iron replaces

the ferr*ous* iron in the cases already reported. In addition to important information of theoretical value, the work is developing a scientific basis for the hydrometallurgy of oxidized copper ores and the recovery of cement copper.

F. K. CAMERON and R. A. LINEBERRY (Progress on Doctoral Dissertation). Apparent Specific Gravity and Moisture Content of Clays. Presented at the Colloid Symposium, Johns Hopkins University, Baltimore, Md. June, 1929.

In this work it has been shown that when water is added to dry clay there is first a concentration in volume until there is sufficient moisture to form a continuous film over each particle. On further addition of water, the apparent specific gravity rises to a maximum, above which point there is free movement of water in the interstices. Drying and rewetting show a hysteresis. A rational mechanism in explanation is developed, and a correlation with plasticity in heterogeneous systems suggested of probably plant use in handling ceramics.

F. K. CAMERON has under way the following investigation:

The Use of Sulphur Dioxide in Separating Phosphoric Acid and Lime.

The work with Mebane and Dobbins having shown the impracticability of the separation in aqueous solution, a study of a dry process has been undertaken. Sulphur dioxide and oxygen form sulphur trioxide, which is absorbed by a heated basic phosphate. Depending upon the temperature, a meta or a pyro acid phosphate is formed. Trituration of the former with small proportions of hot water forms the soluble monocalcium phosphate.

J. T. DOBBINS and W. M. MEBANE have made the following study:

The Estimation of Calcium by Permanganate in the Presence of the Ferric Ion and the Phosphate Ion.

Studies are being made to determine the effect of time, temperature, and concentration of these ions in solution during the precipitation of calcium as the oxalate. This investigation is being carried out to determine the applicability of the method to the analysis of such natural products as limestone and phosphate rock without preliminary treatment.

J. T. DOBBINS and HARVEY A. LJUNG. Oxidation and Reduction: Estimation of Sulfites and Arsenates in the Presence of Each Other.

In another investigation being carried out by the authors, it was found necessary for oxidizing and reducing agents to exist together in solution acid with acetic acid. Since sulfurous acid is a recognized reducing agent for arsenates in acid solution, it was thought advisable to study this reaction in acetic acid solutions.

This study has been based on the modern theories concerning oxidation and reduction, with emphasis placed on the hydrogen ion concentration of the solutions. The newer theories teach that oxidation and reduction reactions are controlled by the hydrogen ion concentration.

A series of samples containing varying amounts of an arsenate were treated with varying amounts of a sulfite. The sulfite was first titrated with standard iodine solution in an acetic acid solution, the solution was then acidified strongly with hydrochloric acid (resulting solution approximately 6 N), potassium iodide was added, and the liberated iodine was titrated with standard thiosulfate solution.

The results show from small to large concentrations of arsenates and that no reduction of the arsenate had taken place in these solutions as prepared. In order to prove further that no reduction had taken place, a mixture of a sulfite and an arsenate was acidified with acetic acid and allowed to stand over night. The sulfite was precipitated as barium sulfite and filtered, the filtrate was acidified strongly with hydrochloric acid and hydrogen sulfide passed into the solution. No immediate precipitate of arsenious sulfide was formed, showing that no reduction of the arsenate had taken place.

HARVEY ALBERT LJUNG (Progress on Doctoral Dissertation). A Proposed Scheme of the Separation of the Anions—Group 1. (Under the direction of J. T. DOBBINS.)

The more recent conceptions concerning oxidation and reduction teach that the control of the hydrogen ion concentration is a most important factor in the progress of reactions of this type, and that for reactions of this type to take place it is necessary that the hydrogen ion concentration be of a certain specified value, usually well above the neutral point. Since it seems necessary, in order for oxidation and reduction to take place, that the medium containing the oxidizing and reducing agents be acid, it has been reasoned that if the hydrogen ion concentration were reduced to such a value as to be below a certain critical concentration little or no oxidation or reduction would take place in solutions containing the oxidizing and reducing agents.

With due regard to the above conceptions, a scheme of analysis and separation of the anions has been proposed.

Group 1 contains those acids whose calcium salts are insoluble in water and saturated calcium hydroxide solution: carbonates, oxalates, sulfites, arsenates, phosphates, arsenites, and tartrates. These anions are precipitated from a solution alkaline with sodium hydroxide as the calcium salts and identified with appropriate tests.

FLOYD H. EDMISTER. Solubility Studies on the Oxides of Tantalum and Columbium. (In progress.)

An attempt to effect a separation of these two elements.

Floyd H. Edmister and William V. Harshman. Factors which influence the Stability of Iodine Solutions. (Submitted for publication.)

A study of the various factors which change the strength of iodine solutions used in titrations, such as light, air, carbon dioxide, concentration, time, and presence of salts in the solution.

Floyd H. Edmister and John B. Gallent. The Aluminates of Calcium.

The formation, composition, and physical properties of these compounds at different temperatures.

H. D. Crockford has published:

The Aqueous Solutions of Cupric and Ferrous Sulphates. (With F. K. Cameron.) *Journal of Physical Chemistry,* XXXIII: 709-716. May, 1929.

Binary Systems of Certain Nitrotoluenes with Salycilic Acid. (With F. W. Zurburg.) (To appear in an early issue of the *Journal of Physical Chemistry.*)

Professor Crockford has under way the following research:

The System: Cupric Sulphate, Ferric Sulphate, Sulphuric Acid, and Water. (With F. K. Cameron.)

For abstract, see p. 104.

L. E. Warrick (Progress on Master's Thesis). The System: Cupric Sulphate, Sulphuric Acid, and Water. (Under the direction of H. D. Crockford.)

Three isotherms for the system: cupric sulphate, sulphuric acid, and water have been determined and progress is being made on a fourth isotherm. Between O°C. and 40°C. the only solid phases found have been the pentahydrate, trihydrate, monohydrate, and anhydrous cupric sulphate. Increase in the concentration of sulphuric acid causes a decrease in the solubility of cupric sulphate, and a decrease in the water of crystallization in the solid phase.

R. W. Bost and P. Borgstrom. Thiophane Studies I. Preparation and Properties of Certain Thiophanes.

Methods for the synthesis of tetramethylene sulfide, pentamethylene sulfide, and hexamethylene sulfide have been worked out. Certain physical and chemical properties of these compounds are now being investigated. Further details will be given later.

R. W. BOST. Reactions of Lead Tetraphenyl.

A study of various reactions of lead tetraphenyl is being made with the idea of using it in certain synthetic organic processes.

The following doctoral dissertations were accepted by the Department during the year:

W. M. MEBANE. The Solubility of the Phosphates of Calcium in Aqueous Solutions of Sulfur Dioxide. (Under the direction of J. T. DOBBINS.)

The addition of sulfur dioxide to aqueous suspensions of the phosphates of calcium increases the solubility of the calcium oxide and the phosphoric acid. The solubility of the calcium oxide is increased more than the solubility of the phosphoric acid.

At 0° C. or at 25° C. there are three solubility curves. On the one corresponding to the lowest concentrations of phosphoric acid, the solubility of sulfur dioxide in the liquid phase rises to a maximum and then falls again. The solid phases in contact with these solutions are calcium sulfite and a series of solid solutions of calcium oxide and phosphoric acid, a limiting member of the series being di-calcium phosphate. On the second solubility curve, the concentration of sulfur dioxide again passes through a maximum. The solid phases in contact with the solutions represented by this curve are mono- and di-calcium phosphates. A third curve, with relatively high concentrations of phosphoric acid, shows negligible and approximately constant content of sulfur dioxide in the liquid phases. Mono-calcium phosphate alone is the solid phase in contact with solutions represented by this curve.

Treatment with sulfur dioxide of an aqueous suspension of a basic phosphate of calcium can yield a solution in which the ratio of phosphoric acid to calcium oxide is somewhat higher than the ratio in di-calcium phosphate. Evaporation of this solution to a concentration at which mono-calcium phosphate would be a stable solid phase involves the loss of 95 per cent of the water and 80 per cent of the phosphoric acid as di-calcium phosphate. As a plant method the procedure is impracticable.

The developed facts explain the failure of previous investigators and inventors to develop the procedure and obtain mono-calcium phosphate or superphosphates by the use of sulfur dioxide in aqueous solutions.

R. D. NORTON. Grignard Reactions in the Para-Cymene Series. (Under the direction of ALVIN S. WHEELER.)

A study has been made on the Grignard reaction in the p-cymene series. When p-cymyl-2-magnesium bromide reacts with aldehydes the normal addition products are not always obtained. *Methyl-p-cymyl carbinol* was obtained when the reagent was treated with acetaldehyde, but we were unable to isolate the respective carbinols with propionaldehyde, butyraldehyde, and benzaldehyde.

Acetone does not give the expected tertiary alcohol when treated with the Grignard reagent. These reactions seem to show that the Grignard reaction does not react normally with all carbonyl compounds.

Carvacrol can be prepared by treating the Grignard reagent with oxygen. Sulfur, which would be expected to react in the same manner as oxygen and give the thiocarvacrol, gives *dicymyl sulfide.* The *sulfinic acid* of *p-cymene* is formed when the reagent is treated with sulfur dioxide.

Chloroform was treated with the Grignard reagent in order to replace the chlorine atoms with the cymyl group. The expected compound could not be isolated and in all experiments a trace of bromine could be detected in the resulting product. Bromoform was treated with the reagent in the same manner with the same results. A pure product for analysis could not be obtained.

Mercuric chloride will react with the Grignard reagent to give both *mercuribis-p-cymene* and *1-methyl-4-isopropylphenyl mercuric chloride.* The latter compound is obtained when the mercuric chloride is added to a boiling ether solution of the reagent and allowed to reflux for several hours. The mercuribis-p-cymene is formed when the mercuric chloride is added to the cold reagent and refluxed for a few minutes.

Dimethyl sulfate reacts with the Grignard reagent forming *1-2-dimethyl-4-isopropylbenzene.*

The following masters' theses were approved by the Department during the year:

JAMES OLIVER DUNSTON. Color and Odor Constituents in Menhaden Oil. (Under the direction of F. C. VILBRANDT.)

Samples of menhaden oil were treated with the following reagents: Sulfuric acid, benzenesulfonic acid, stearic acid, boric acid, hydrochloric acid, alum, alcohol, sodium carbonate, sodium bicarbonate, calcium hydroxide, filtrol, clay, sawdust, hydrogen, oxygen, and air. The temperatures used were, 20° C., 100° C., 200° C. under atmospheric pressure and vacuums of 15 and 25 inches mercury for periods of 4 and 8 hours. Samples of both raw and centrifuged oils were used in these tests.

The following conclusions were drawn:

Hydrogen-ion concentration. The intensity of the color varies directly as the hydrogen-ion concentration. The hydrogen-ion concentration has practically no effect on the odor. Sulfuric acid in small quantities tends to decrease the color.

Absorbing agents. Most absorbing agents slightly decrease the color and tend to decrease the odor but not in proportion to the amount of reagent used.

Alkali. Bicarbonate of soda seems to be the best decolorant, but saponification is produced on heating.

Vacuum. The odor is not affected by vacuum treatment. Therefore, it must be somewhat fixed and has a great affinity for the oil.

Centrifuging. Centrifuging threw down the solid particles and slightly decreased the odor, the odoriferous substance tending to remain in solution in the oil.

WELDON V. HARSHMAN. A Study of the Iodometric Process of Analytical Analysis. (Under the direction of F. H. EDMISTER.)

In this investigation the authors have made a study of the various factors affecting the stability of iodine in aqueous solutions, in so far as iodine is used as an oxidizing reagent in the analytical analysis. It was found that air and light cause a considerable loss in the oxidation value of the iodine. To overcome these factors it is suggested that when H_2S is determined by aspirating a gas through the iodine, nitrogen be substituted for air, and that a minimum of light be present in the laboratory, and that preferably from an incandescent bulb. It is also suggested that before the aspiration of the sample a small quantity of potassium iodide (1 gm.) be added to the iodine and thiosulfate solutions. The use of rubber stoppers in the aspirating flasks is not objectionable. CO_2 affects thiosulfate, but not iodine. Good results, in the analysis of H_2S, can be obtained by observing these modifications.

GEORGE CLINTON HOLROYD. The Action of Benzoylacetone on 4-Phenylsemicarbazide. (Under the direction of ALVIN S. WHEELER.)

Benzoylacetone, m. 61°, was made from ethyl acetate, acetophenone and sodium. The sodium salt was decomposed with acetic acid. 4-Phenylsemicarbazide was prepared from phenylurea and hydrazine hydrate. These substances condense with each other in absolute alcohol solution immediately, eliminating water and forming *1-phenylcarbamyl-3, 5-phenylmethylpyrazole*, m. 162.° The pyrazole is decomposed by water, methyl and ethyl alcohol on long boiling, forming in each case *3, 5-phenylmethylpyrazole.*

A. E. HUGHES. The Binary Systems of Some Nitrotoluenes with Benzoic Acid. (Under the direction of H. D. CROCKFORD.)

The temperature-composition diagrams have been determined for the systems of benzoic acid with each of the following: p-nitrotoluene, o-nitrotoluene, 2-4-dinitrotoluene, 2-4-6-trinitrotoluene.

From the data compiled the latent heat of fusion of the various components has been calculated.

The method used is believed to be far superior to the methods employed by other investigators. The apparatus consisted of a thermocouple, galvanometer, and accessories. In one case the readings were automatically recorded on a photographic plate and in the other case were taken directly from the galvanometer. An accuracy of one-tenth degree was obtained by the first method and of one-hundredth of a degree by the second method. Samples averaging one gram in weight were employed.

J. G. PARK. P-cymyl-4-semicarbazide (2) and Certain Derivatives. (Under the direction of ALVIN S. WHEELER.)

The first step in this study was to convert 2-aminocymene into p-cymylurea. An aqueous solution of its hydrochloride was heated with urea. A mixed product was obtained but p-cymylurea could not be isolated therefrom. After many recrystallizations a small amount of a new product, *di-p-cymylurea,* m. 240°, was isolated.

P-cymylurea was obtained by two methods: (1) by treating an aqueous solution of aminocymene hydrochloride with an aqueous solution of potassium cyanate; (2) by treating a glacial acetic acid solution of aminocymene with powdered potassium cyanate. The second method gives a better yield and a purer product. The urea melts at 168.5°. *P-cymyl-4-semicarbazide (2)* was prepared by boiling for 30 hours an alcoholic solution of p-cymylurea and hydrazine hydrate. Melts at 112°. Its hydrochloride melts at 166°-8°. The semicarbazide was condensed with a variety of ketones, aliphatic, aromatic, cyclic and mixed. Condensations took place rapidly except with the pure aromatic ketones. These required the presence of some acetic acid and long heating. The semicarbazones of 11 ketones were prepared. They were all crystalline, some forming microscopic crystals. The following ketones were used, the melting point being that of the semicarbazone: acetone, 182°; acetophenone, 212°; methylethyl ketone, 182°-3°; δ, γ-dichloro-acetone, 173°; benzophenone, 150°; camphor, 217°; cyclohexanone, 192.5°; mesityl oxide, 163°; acetoacetic ester, 133.5°; carvone, 97°; benzoin, 172°.

CHAS. L. THOMAS. Para-cymylhydrazine (2) and Derivatives. (Under the direction of ALVIN S. WHEELER.)

P-cymylhydrazine (2) was prepared by diazotizing 2-aminocymene and reducing the product with sodium sulfite. The following salts were prepared: *hydrochloride,* m. 198°; *hydrobromide,* m. 174°; *nitrate,* m. 70°; *sulfate,* m. 130°; and *picrate,* m. 124° with explosion. The following hydrazones were made: cinnamic aldehyde, m. 90°; acetophenone, m. 83°; ethylmethyl ketone, m. 57°; salicylic aldehyde, m. 87°; benzaldehyde, m. 84°; benzophenone, m. 88°; the *p-nitrobenzoyl* derivative m. 177°. Also two semicarbazides: *2-cymyl-1-semicarbazide,* m. 171° and *2-cymyl-1-thiosemicarbazide,* m. 184°.

DEPARTMENT OF CIVIL ENGINEERING

T. F. HICKERSON is completing his work on Continuous Beam and Column Design, a brief outline of which was published in the *Proceedings of the American Society of Civil Engineers,* January, 1928.

Two-span, three-span, and four-span construction, symmetrical and unsymmetrical, with varying degrees of end and intermediate column restraint have

been fully treated. Appropriate applications of the Slope Deflection Method have yielded formulas for Bending Moments and Shears at the ends, middle, and quarter points of the various beams.

General formulas expressing the effects of each span loaded separately have been developed. But these expressions are complicated and inconvenient for practical use in the ordinary design of buildings, bridges, or any case of continuous monolithic beam and column construction. Therefore, to render the method easily adaptable to the conditions of practice, computations were made for tables of Shear and Moment coefficients covering 75 pages; so that the designer has only to select the right set of factors in order to derive the maximum Shear or Moment at any of the critical sections of the beam or column. These tables satisfactorily provide rational and economical methods of design which should displace the simple but inexact rule of thumb formulas now too much in vogue among engineers.

A comprehensive treatment of the subject, including tables, will be published as a 250-page volume by the McGraw-Hill Book Company of New York.

THORNDIKE SAVILLE has published during the year:

The Water Supply of Caracas, Venezuela. *Journal New England Water Works Association,* September, 1928.

Describes the writer's investigation of sources of additional water supply for this South American city of about 150,000 inhabitants, made during a year's leave of absence as a member of the special staff of the Rockefeller Foundation, assigned as consulting engineer to the Government of Venezuela.

Inlets on Sandy Coasts. *Proceedings American Society of Civil Engineers,* January, 1929.

Discussion of a paper by Earl J. Brown describing investigations conducted by the writer on the coast of North Carolina.

H. G. BAITY and F. M. BELL. Reduction of the Biochemical Oxygen Demand of Sewage by Chlorination. *Journal North Carolina Water and Sewage Works Association,* Vol. VI, 1928, and *Sewage Works Journal,* Vol. I, No. 3, 1929.

This paper gives the results of a long-time study on the effect of chlorination on the biochemical oxygen demand of settled sewage. Chlorine, when applied at the rate of 5 to 7.5 parts per million, effected a B. O. D. reduction of the sewage of about 7.5 per cent; when the chlorine dosage was 8 to 10 p.p.m. the decrease in B. O. D. was 15 to 20 per cent; and an application of 10 to 15 p.p.m. produced a B. O. D. reduction of 25 to 45 per cent. No appreciable oxidizing effect was observed where free chlorine did not exist after 10 minutes contact with the sewage, but dosages in excess of that required to give 0.5 p.p.m. free chlorine were found to produce little additional stabilization of organic material.

This study shows that chlorine may be advantageously applied as an oxidizing agent where sewage treatment plants are overloaded, for retarding decomposition in a small stream until the sewage can be carried down stream to greater dilution, or for intermittent use on raw, settled, or filtered sewage during the dry seasons of the year when stream flow is at a minimum. For such uses chlorination can be employed for about one-tenth the cost of installation of additional plant facilities which would otherwise be necessary.

H. G. Baity. The Disposal of Domestic Sewage. *Bulletin North Carolina State Board of Health,* July, 1928.

This paper discusses the physical and biochemical processes that are utilized in sewage treatment, and describes the modern developments in sewage treatment devices that are employed to accomplish any desired degree of purification.

H. G. Baity and Albert M. Worth. Studies on the Treatment of Combined Sewage and Textile Wastes. *Journal North Carolina Water and Sewage Works Association,* Vol. VI, 1928.

This paper gives a summarized report of a two-year study on the quantities, characteristics, and methods of treatment of textile wastes from mills and dyehouses located in the city of Durham, N. C. Results are given for the physical, chemical, and bactericidal qualities of the various dye, bleach, kier, degumming, sizing, processing and rinse liquors which are discharged into the domestic sewerage system and which comprise about 25 per cent of the total sewage flow. The chemical precipitation experiments on the several component wastes are reviewed, and the results of operation of experimental treatment units with the combined sewage and wastes are given. Loading factors and efficiencies are established for sedimentation, sludge digestion, trickling filter, cinder filter, sand filter, and activated-sludge processes of treatment.

H. G. Baity and Albert M. Worth continued their studies on the experimental treatment of combined sewage and textile wastes, under a coöperative agreement with the city of Durham, N. C.

H. G. Baity and Wm. T. Bolen, following previous studies on the use of chlorine for reducing the biochemical oxygen demand of settled sewage, have made an investigation during the year on the effect produced in the water of a stream by chlorination of sewage entering it. Gaging stations have been operated on Bolin's Creek and the outfall of the Chapel Hill sewage treatment plant, and daily tests of stream quality have been made at a number of sampling stations located down stream from the point of junction. Owing to the variable factors of quantity and quality of sewage and stream flow and sludge deposits, this investigation will be continued for another year before final conclusions are made.

RALPH M. TRIMBLE and A. R. HOLLETT are studying the effect of the shape of sand grains upon the physical characteristics of fine aggregates.

The customary sieve analysis does not distinguish between spherical and angular grains, and as this factor is of importance in bituminous highways, sand filters, concrete design, and the like, other methods of analysis are being investigated and developed to measure this property. A standard of comparison for general sand analysis has been derived—a step not previously accomplished.

RALPH M. TRIMBLE and C. E. FELTNER, JR. (in consultation with DR. WILLIAM CAIN) are engaged in the determination of the coefficients of friction and cohesion in soil.

These studies include the effects of compaction, moisture content, and shape of the earth column. The tests involve triplicate determinations of the coefficients using (a) a square column, (b) a rectangular column with longitudinal displacement, and (c) a rectangular column with lateral displacement. The pressures used to date range, in 100-pound increments, from zero to 1,500 pounds per square foot. So far only granular material has been studied.

DEPARTMENT OF CLASSICAL LANGUAGES AND LITERATURE

J. PENROSE HARLAND has published a report on the Aegean Influence in Sicily in the Bronze Age. *The American Journal of Archaeology,* 1929, 106-07.

PROFESSOR HARLAND is continuing his work on The Excavations of Tsoungiza, the Prehistoric Site at Nemea. He is also continuing to collect and assemble material for the work on The Helladic Civilization (Prehistoric Greece), as outlined in *Research in Progress,* 1927-1928, p. 27.

The following doctoral dissertations were accepted by the Department during the year:

MACK HALL GRIFFIN. The Administration of the Roman Province of Cappadocia. (Under the direction of G. A. HARRER.)

In this monograph an attempt has been made to study the changes in administration employed by the Romans in the province of Cappadocia and to collect and date the imperial legates serving there. The period chosen is from the year 17 A.D., when Cappadocia was taken into the Roman empire, to 285 A.D., the year of the reorganization by Diocletian.

Chapter I deals with the date of the incorporation within the empire of Cappadocia as a procuratorial province in 17 A.D. and the boundaries of the province at that time.

About 71 A.D. the emperor Vespasian reorganized eastern Asia Minor and for purposes of administration joined to Cappadocia the province of Galatia. Chapter II discusses the date of this union and the reasons for it. Also, the legions given to Cappadocia are seen to have been the XII Fulminata and XVI Flavia for the period c. 71 A.D.-115 A.D., and the XII Fulminata and XV Apollinaris for the period 117 A.D.-285 A.D. Trajan used the Cappadocian legions in his Parthian campaign and, consequently, there were no legions in Cappadocia from 115 A.D. to 117 A.D. The joint province Cappadocia-Galatia is next shown to have comprised the following administrative units: Cappadocia, Galatia, Pontus Polemoniacus, Pontus Galaticus, Armenia Minor, Pisidia, Lycaonia, Paphlagonia, Phrygia, and Isauria.

Trajan, after his successful conquest of Armenia, separated Cappadocia and Galatia in 115 A.D., and that same year added Armenia Major to the authority of the Cappadocian legate. After the separation of Galatia from Cappadocia the former retained Phrygia, Pisidia, and parts of Lycaonia and Paphlagonia. The two Pontic districts, together with Armenia Minor, remained with Cappadocia and Armenia Major. In 117 A.D. Hadrian released Armenia Major from the empire and placed it in its former position as a dependent principality. Cappadocia underwent no further changes until the reign of Diocletian. Chapter III discusses these changes in administration and the date and causes for such changes.

In Chapter IV are listed the legates of Cappadocia in chronological order, together with their dates determined as accurately as the evidence will permit.

E. P. WILLARD, JR. Seneca as a Source for Information on the Early Roman Caesars. (Under the direction of G. A. HARRER.)

This investigation purposes to go into the matter of Seneca's comments concerning the Julio-Claudian Caesars, including Julius Caesar, and it is desired to develop a true and complete understanding of this Senecan material, with a view of determining the value of Seneca as a contemporary source from which to derive information on early Roman imperial history.

In dealing with the Senecan material, attention is given to the matter of Seneca's opinions and also his statements of fact. The method of procedure which is employed consists, first, of a complete list of his references to the particular emperor under consideration. Then follows a short statement as to the amount and distribution of comment, and whether or not it is favorable in its general tone. Then are taken up various matters, more or less specific, with regard to the emperor in question, beginning with his more strictly personal characteristics and then taking up matters which concern him more in his official capacity. From all this is developed information as to the character of the Caesars, as well as their acts, achievements, and abilities.

Seneca is essentially a philosopher and is interested primarily in ethical matters. The Caesars themselves are of secondary importance, and their acts and characteristics are made use of to illustrate various points in morality. In so using the Caesars Seneca very often strains the comparison and makes it

appear that an emperor possessed a characteristic which it can be shown is not attributable to him. Seneca also sometimes interprets an act of an emperor in such a way as to indicate the existence of a characteristic which is in fact nonexistent. This "misuse" of an act of an emperor is quite prominent in Seneca.

There is also the factor of personal prejudice. Seneca was closely associated with some of the emperors and, in his direct relations with them, there existed certain prejudices. However, on the whole, this element is of rather small importance or is readily discounted. In general, Seneca considers the Caesars objectively.

It is Seneca's practice to praise a living emperor by discrediting his predecessor. Thus Seneca praises Claudius by condemning Caligula and, in turn, glorifies Nero by discrediting Claudius. Seneca presents an idealized picture of Nero, with the hope that this prince will realize the ideal set forth; he represents Claudius in a favorable light in order to effect a personal object.

There are then various conditions and circumstances relating to the composition of Seneca's works which must be taken into account, since they enter into and control the nature of the sentiments expressed. There is found to be much exaggeration in Seneca's comments, and many statements are made which are not to be taken at their full face value.

While Seneca is not a historian, there is much historical material to be gathered from his comments. It has been found that he always bases his stories on fact. However, there is a rhetorical element present which has to be allowed for. We do not expect a full account of the acts and characteristics of the Caesars because Seneca, interested only in moral matters, has occasion to mention only a few of such acts and characteristics. Seneca does not, as a rule, mention any sources. His information is given to us first hand, and we thus have in Seneca the observations of an important and well informed author who was contemporary with most of the events which he relates.

The following master's theses were accepted by the Department during the year:

IVA LELAND BARDEN. The Life and Literary Works of M. Caelius Rufus. (Under the direction of G. A. HARRER.)

This study consists of a biographical sketch of Caelius Rufus, for which the sources are to be found largely in writers contemporary with him, and of an account of his literary work. There are included also the extant fragments of Caelius' Orations and references to his extant letters. A comparison of his writings with those of Cicero show that Caelius was quite independent in his use of words.

PHILIP MACON CHEEK. Principles of Arrangement of Material in Tacitus' Major Historical Works. (Under the direction of G. A. HARRER.)

This study is an investigation of the artistic principles of the synthesis of material in Tacitus' major historical works. In regard to the general arrange-

ment, it will be found that Tacitus worked on three distinct principles, each of which may be clearly defined in spite of the fact that they blend into one another to form a consummate whole. The most obvious and mechanical of these is the annalistic arrangement which groups the events of each year into a definite unit; a more artistic and, therefore, less tangible principle is the unity of book through which the author constructs a series of unified groups as a rule evolving around some central movement or theme. A third is that of episodical unity which results from Tacitus' dramatic instincts and development of his material into dramatic acts. These three are intimately related, and any one of them may be occasionally subordinated to any other to satisfy the artistic feeling of the author.

Virginia Dean. Augustus in Contemporary Poetry. (Under the direction of G. A. Harrer.)

This study embraces the collection and organization of the most significant passages in which the Emperor Augustus is mentioned in the works of the poets of his time. Where possible the references in the poets have been set against a very brief consideration of their historical background and practices generally prevalent in that age. The study has led to the following conclusions: (1) that Augustus is mentioned frequently by name, title, or epithet in the poetic works; (2) that there are striking likenesses in the terms which the poets apply to Augustus; (3) that in by far the greater number of cases the points mentioned are those which would be of immediate interest to the people; (4) that there is no material difference between what the poets have to say in regard to the Emperor and what was generally thought about him in that day; and (5) that at times the poets vary from absolute fact both through anticipation of events and through exaggeration.

Ruth Fleming. Gaius Trebatius Testa. (Under the direction of G. A. Harrer.)

In this study the facts of the life of Gaius Trebatius Testa, a contemporary and younger friend of Cicero, are: Trebatius, born 85-80 B.C. in a family of equestrian rank, probably spent his boyhood at Velia in Lucania. Later, in Rome, he became a friend of Cicero and an active juris-consult. In April of 54 B.C. Cicero recommended him to Caesar in Gaul, where he probably served as legal adviser until the beginning of the Civil War in 49 B.C. After Caesar's death we know only that he followed his profession and won renown in it. He remained in the equestrian order. Probably he was not given the *ius respondendi*, which may be evidence that it was not granted in the time of his career. Augustus consulted him on occasion. Horace was a friend.

Trebatius' legal works are listed by titles, which have been obtained by citations and quotations largely in the *Digest*. The extant fragments have been quoted and Trebatius' use of vocabulary and syntax compared with that of Cicero.

MARY SILEMA LAWRENCE. Certain Questions of Composition in Ovid's *Heroides*. (Under the direction of GEORGE HOWE.)

This is a study of the poet's method of interweaving into an epistle a persuasive argument and such part of the heroine's story as is essential to the general reader's understanding of her situation at the moment of writing. The investigation resolves itself into an analysis of the openings, the closings, and the body of the letters. The openings—formal, informal, or abrupt—perform the function of introducing story and argument, and are little influenced by epistolary practice. The closings consist of appeals for rescue, appeals for restoration of former relations, and threats or curses. Each serves as a summary of the points of the argument and as a period to the story. Epistolary rules have no part here. In the body of the letters, the poet has the three-fold task of telling a story, pleading a cause, and maintaining the letter-form. Therefore, pure narration must be justified (as it is) by its value in the argument. Reproaches, appeals, and threats, giving, as a rule, the past, the present, and the future respectively, maintain the epistolary form. A general conclusion sums up the findings in regard to each section. The poet's disregard at will of epistolary convention, his use of narrative, reproach, appeal, etc., and his transitional methods are discussed briefly.

FLORENCE EGERTON UNDERHILL. Horace and the Early Latin Poets. (Under the direction of GEORGE HOWE.)

The purpose of this paper is to examine the various allusions, direct and indirect, found in Horace to the early Latin poets, and to determine from this examination just where in the scale ranging from excessive admiration to sweeping condemnation Horace's real attitude is to be placed. The conclusion reached is that Horace goes to neither extreme. He points out the faults of the early Latin poets, but at the same time he shows a genuine respect for them. It is the sort of respect, however, which a man belonging to a later period of polished and developed art, of broader and deeper education, might be expected to feel for the best efforts of a cruder age.

The following studies have been undertaken by candidates for advanced degrees:

SARAH LETTICE FOSTER. Pliny the Younger's Reading in Greek and Latin Literature (for the doctor's degree).

EDGAR BRYAN JENKINS. Index Verborum of Terence (for the doctor's degree).

KATE DEROSSET MEARES. Literary Patronage in the Post-Augustan Age (for the doctor's degree).

Sarah Janis Bush. The Career and Literary Work of M. Aemilius Lepidus (for the master's degree).

Frederick Boyden Nims. Vergil's Use of Works of Art in the Aeneid (for the master's degree).

DEPARTMENT OF ECONOMICS AND COMMERCE

C. T. Murchison is engaged in the following studies:

Business Cycles and Individual Industries.

A study of selected major industries in their relationship to fluctuations in the general volume of business. The industries studied are the automobile industry, the construction industry, the iron and steel industry, the power industry, and the textile industry. In the analysis of each industry an attempt is made to distinguish between the behavior which is primarily conformative or passive in type, and that which arises from conditions peculiar to the industry and therefore to be regarded as dynamic in character. (To be published in book form in 1930.)

The Cotton Textile Industry, An Economic Analysis.

A study of the factors which seem to account for the failure of the industry to share in the great general prosperity of the period from 1922 to 1928. Also an examination and appraisal of current movements in the industry that seem directed toward an eventual solution of its problems. (To be published as a monograph in the fall of 1929.)

In January, 1929, E. W. Zimmerman joined a staff appointed by the Brookings Institution of Washington, D. C. to study social, economic, and financial problems of Porto Rico. Dr. Zimmerman returned in the latter part of February and wrote his report on External Trade and Shipping Problems of Porto Rico.

Since the completion of this report, the work on the manuscript on Resources and Industries has been resumed.

John B. Woosley. The Taxation of Banks.

During the year a study of the Taxation of Banks in North Carolina was completed and published in the *Report of the Tax Commission of North Carolina.* Further investigation in the taxation of banks in other states is now being made preparatory to a synthesis of the methods and results of this type of taxation, together with its probable influence on banking organization in the United States.

C. P. SPRUILL has completed a study of Taxation of Inheritances and Estates. *Report of the Tax Commission of North Carolina*, 1928.

The following master's theses were accepted by the Department during the year:

E. H. GRAVES. The Modern Wage Policy of the American Federation of Labor. (Under the direction of H. D. WOLF.)

The purpose of this study is to attempt an evaluation of the modern wage policy of the American Federation of Labor adopted in 1925. Industrial conditions in America had changed to such an extent since 1900 that the principles formerly used by organized labor in arguing for higher wages had been growing less and less adequate. With the increase in national wealth, labor had come to feel that it could no longer be satisfied with the former small share of the national income and also that its own increased productivity justified it in demanding a larger share.

In 1925, therefore, the American Federation of Labor formulated a new wage policy. This policy describes the social and industrial ill effects of low wages; declares that justice and the maintenance of industrial stability require that wages increase commensurately with the workers' productivity; and promises, in return for steadily rising wages, the coöperation of organized labor in increasing industrial efficiency.

This study gives a brief sketch of the changes which necessitated the adoption of the modern wage policy; traces the development of the policy within the American Federation of Labor; and examines the adequacy of the policy to fit the new situation.

RALPH MARION LEE. The History of the Farmers' Federation, Incorporated, of Western North Carolina. (Under the direction of C. T. MURCHISON.)

This study is primarily an analysis of the organization, marketing principles and methods, the assembly of finances for fixed capital requirements, and operating expenses, and the economic significance of the Farmers' Federation, Incorporated, of Western North Carolina. In the analysis attention is also given to the growth and development of the Federation.

The Farmers' Federation was organized and incorporated under the laws of North Carolina, July 15, 1920. The Federation is a capital stock organization with an authorized issue of $500,000.00 common stock and $250,000.00 preferred stock. At the present time the Federation has a total paid-in capital stock of $243,000.00, with 2,200 members located in Buncombe, Henderson, Polk, and Rutherford counties. The assets of the Federation are $750,000.00, with $500,000.00 invested in buildings, real estate, and equipment. The Federation has eight distributive warehouses, two of which are wholesale produce houses, and twenty-four motor trucks, which are used in delivering farm supplies to the farmers and in assembling the farm produce at the warehouses.

A volume of business of more than a million dollars is transacted annually, $400,000.00 of which is transacted by handling produce imported from other states.

The Farmers' Federation has an Educational and Promotion Fund of $142,000.00, which it is now using to develop new agricultural industries in Western North Carolina and to educate the farmers to new methods of production.

In the assembly of materials only primary sources are used. Visits to the various warehouses, personal conferences with the chief officials, and the records and reports of the auditor are used.

Collier Bryson Sparger. Bus Accounting. (Under the direction of D. D. Carroll.)

Motor bus transportation has developed from almost nothing in 1920 to a very important factor in 1928. North Carolina passed a law in 1925 giving the Corporation Commission power to regulate bus companies as public utilities. In order to determine effectively fair passenger and freight rates, some uniform system of account keeping and reporting must be kept by all bus companies operating in the state.

The system presented is devised to give the Corporation Commission the information necessary for wise supervision, and to give the bus operators comparative costs and other information necessary for sound financial policy.

The thesis is divided into six parts: (1) The introduction. An attempt is made to show the problem and the purpose of the thesis. (2) A uniform classification and chart of accounts to be used by all bus companies. (3) An explanation to indicate the nature of each account and to show its use. (4) An explanation of the various forms. Each form is explained in detail, showing the type of information to be acquired and the entries necessary to get this information. (5) Financial reports. A *pro forma* balance sheet and profit and loss statement are presented. Reference is made to other statements needed to give statistical information, and to supporting schedules. (6) Forms.

John Daniel Vann, Jr. Cost Accounting as an Aid to Management. (Under the direction of D. D. Carroll.)

Cost accounting has developed out of the manufacturer's need of records to show the efficiency with which the manufacturing, selling, financial, and administrative divisions of the business are operated. The prime purpose of management is to make the largest amount of profits possible, and in order to do this the plant must be operated as smoothly and efficiently as possible. This is true especially because of the presence of business fluctuations in our economic organization and because of competition in industry. A good cost system will render aid in this respect.

An executive needs cost statistics to help him to formulate general business policies, to make specific decisions, and to control and measure the work of the various subordinate officers in their efforts to eliminate waste and to increase

the efficiency of all factors and elements to a maximum. Cost accounting aids the management in its control of the machinery and buildings necessary for production and in connection with the productive process in general. Money saved in the operating division of the business should not be lost in efforts to sell the products without proper attention to the profit made on goods sold and without coördination between production and sales departments.

Standard costs, the latest development and adaptation of cost accounting principles, are now used to a large extent in our larger industrial plants, for they, more than systems formerly used, help to measure the efficiency with which the whole business is operated. Much emphasis is placed on them in this study.

A cost system, to be of value to the management, must provide for the prompt presentation to the executive and department heads of accurate statements well classified for their use in carrying out effectively their functions in the organization. The statements of greatest value in a large plant are probably those prepared from the operation of a combined standard cost and budget system. Finally, cost reports may be shown in graphic or chart form to help the executive to see the conditions in the plant in their proper perspective.

DEPARTMENT OF EDUCATION

EDGAR W. KNIGHT has published during the year:

Education in the United States. Ginn and Company, June, 1929. (8 vo., cloth, xi, + 588 pages.)

A history of American education.

PROFESSOR KNIGHT has continued to collect documents illustrating American educational history, which he plans to publish later.

A. M. JORDAN. Mental Growth. (Submitted for publication to the *Journal of Educational Psychology.*)

Many questions have arisen as to the form of growth curves at different ages and at different levels within the same age. The constancy of the I. Q., too, whether at the level of the gifted or at the level of the moron, has been of interest to the students of mental life for several years. It was for the purpose of throwing additional light upon these problems that this study was undertaken.

One hundred and eighty-three children located in grades III to VIII were tested semi-annually for three years with the National Intelligence Tests. Both sections of the test were used and the forms of the test so manipulated that the pupils took the same test a second time only after a period of eighteen months.

Conclusions: The mental growth of young children in a community such as we have utilized is well represented by a straight line curve which in slope approaches very closely an angle of 45 degrees. Evidence for this conclusion

appears as follows: (1) When averages are used at the separate ages and these records are plotted they approach such a straight line in form. (2) When each child had six semi-annual measurements, the curves of growth of children at the ages 9, 10, 11, and 12 were steadily upward. (3) The curves of high, average, and low groups at each age showed this same shape. (4) In six consecutive semi-annual measurements of 183 individuals the average I. Q. varied but little from year to year. The graphs ran parallel to those of Baldwin. (5) When I. Q.'s of different levels (there were five levels, to wit: 110-119; 90-109; 80-89170-79; and below 70) were computed separately it was found that there were no more changes in the high I. Q.'s than in the low ones.

R. W. TYLER is acting as statistical consultant for the study of Adult Reading Interests and Needs which is being conducted by the Graduate Library School of the University of Chicago and financed by the Carnegie Corporation. During the year he has developed new statistical methods for use in analyzing social groups which have been used by the Commonwealth Fund and reported in *The Commonwealth Teacher Training Study,* University of Chicago Press, 1929.

With MRS. ELIZABETH C. MORRISS and six Buncombe County principals he has been making a study of Present Practice and Attainable Objectives in Elementary School Supervision to be reported in October.

With PROFESSOR DOUGLAS WAPLES of the University of Chicago he has prepared a manual for the use of teachers and supervisors, entitled Research Methods and Teachers' Problems, which is a description and illustration of research methods which may be used by teachers in service for the investigation of classroom problems.

PROFESSOR TYLER presented a paper before the National Society of College Teachers of Education describing Techniques for Constructing Teacher Training Curricula.

With MISS JANE C. SULLIVAN and seven Buncombe County teachers he has developed and tested four new methods for directing learning in the high school, to be published in October.

J. MINOR GWYNN is still engaged in the examination and compilation for publication of a comprehensive bibliography for teachers of high school Latin.

The following doctoral dissertation was accepted by the Department during the year:

ROY WILLIAMSON MORRISON: Some Inequalities in North Carolina Elementary Schools. (August, 1928.) (Under the direction of M. R. TRABUE.)

North Carolina is theoretically committed to the principle that the state must provide equal training for all children in the elementary school. This equality of provision is ordinarily conceived in terms of uniformity of school term, of buildings and equipment, and of standards of teacher training.

Seventeen North Carolina elementary schools were selected for study. These were divided into three groups: four schools of one city system, eight other city schools, and five rural schools. In each of these groups uniformity in school term, in school buildings and equipment, and in standards of teacher training had very largely been obtained. The same course of study was used in all the schools of each group and the same standards of promotion were supposedly employed. Data on their progress through the grades and on the social and economic status of their families were obtained from 6,623 pupils in Grades I-VII. Objective tests of achievement were administered to 2,805 children in Grades III-VII.

It was found that: (1) approximately one half of the pupils in the elementary school had been eliminated before they reached the seventh grade; (2) a large proportion of those pupils who remained in school had repeated one or more grades; (3) a considerably larger proportion of repeaters than of non-repeaters had been eliminated; (4) there were differences in children's rates of progress in achievement which correspond to the differences in the rates of their progress through the grades; (5) from lower to higher grades a progressively larger proportion of pupils were handicapped in their development by having been placed one grade or more too high or too low.

True equality of educational opportunity, however, would consist in the provision for each child of such facilities that the development of all his capacities would go on continuously and systematically. When children are able to progress at unequal rates and to benefit from the same curriculum in unequal degrees, equality can be obtained only by the differentiation of materials and methods, and of the standards of work required.

Differences in progress and achievement are not necessarily conditions which could or should be removed. They are evidences of the unfairness of making the same provision for children of unequal heredity and environment and of requiring of them the same quantity and quality of work. Careful experimentation in the public schools is the only method of determining exactly what provision should be made for different children and for different groups.

The following master's theses were accepted by the Department during the year:

AUGUSTUS RUFUS BULLOCK. An Educational Survey of the Placement of Pupils in the Elementary Grades of Salisbury City Schools. (August, 1928.) (Under the direction of E. R. MOSHER.)

The purposes of this educational survey are twofold: (1) to point out and compare the discrepancies between the actual grade placement of pupils in the elementary grades of the Salisbury city schools and the grade achievement; and (2) to make recommendations for the solution of the existing conditions, so that the individual needs of the pupils may be met more adequately.

In order to find the discrepancies between actual grade placement and grade achievement, the Stanford Achievement Tests were given to all pupils and their grade achievement norms were taken from the composite scores. The survey showed a much wider dispersion of grade achievement than grade placement. Many pupils had been pushed beyond their grade achievement, many pupils had been placed below their grade achievement, and a number of much over-age pupils chronologically existed. There was a tendency to make each chronological age group conform to a compactness not compatible with its achievement.

The problem for solution centered around the groups mentioned in the preceding paragraph. Different outstanding methods used by some other school systems, such as Winnetka and Los Angeles, were studied in order to see how they solved the question of individual differences of the "misfit" groups.

Bonnie David Bunn. The Growth and Development of Public Education in Harnett County. (August, 1928.) (Under the direction of E. W. Knight.)

The purpose of this study is to show the growth and development of public education in Harnett County, North Carolina.

The county is considered a manufacturing county, although the occupation of most of the people is farming. The population in 1920 was 28,313 and in 1925 the estimated population was 32,500. Ninety-nine and eight-tenths per cent are American born, twenty-four per cent are negroes and seventy-five and two-tenths are white. The county is geographically located along the fall line.

Harnett County schools were beginning to develop before 1860, but the Civil War checked this progress. The total disbursements for schools in 1900 amounted to $6,979.36 and in 1926 they amounted to $689,979.08, an increase of 9,776 per cent.

The creation of a literary fund in 1825 and the passing of a public school law in 1839 were the beginning of an educational plan which led to the election of a state superintendent of public instruction, namely, Calvin H. Wiley, in 1853. At the close of the Civil War the schools were found in destitute circumstances. Mixed schools were provided for by an Act of the General Assembly in 1869. This Act was adopted in the Constitution in January, 1877.

The high school consolidation for the county is complete. Attention is now turned toward the consolidation of elementary schools, classroom organization, and curriculum building. There are thirty-two elementary schools in the county which are separate from the nine high school units. With four exceptions, these elementary school units are to be consolidated with the high school units.

CURTIS CRISSMAN. Some Present Practices in School Transportation in North Carolina. (August, 1928.) (Under the direction of E. W. KNIGHT.)

Transporting school children in North Carolina has been going on for more than fourteen years. At present there are about 3,000 trucks carrying over 106,000 children at an annual cost of around $2,000,000.

There are about as many different systems in the state as there are counties that have transportation of school children. Each county has its own plan of buying supplies and having the repair work done. There is practically no uniformity in the policies and practices that are followed. No definite conclusions have been reached as to which kind of driver is the best. There is very little common agreement as to what constitutes an economical and at the same time an efficient school transportation system.

This is merely a preliminary study. There is need for a more careful and comprehensive study of the whole problem of: (1) the three different plans of operation that are discussed in this paper; (2) the kind of driver which is the best; (3) the effects roads have on the life of trucks; (4) reasonable cost for transportation; (5) possible need of a superintendent of transportation; and (6) records. To make this study intelligently it would be necessary to visit each county and secure the data first-hand from the proper officials.

LOUISE DAVIS. The Growth and Development of Education in Greenwood County. (August, 1928.) (Under the direction of E. W. KNIGHT.)

The purpose of this study is to show the growth and development of the schools from their beginning to the present time in what is now known as Greenwood County, South Carolina.

Prior to the Civil War schools were established in what is now Greenwood County, long before the present system of public education came into existence. There is very little information as to what these schools accomplished, but they probably served as a foundation for the establishment of a system of public education.

The first adequate provisions for public schools in South Carolina came as late as 1870. Before this time Greenwood suffered from inadequate educational provisions just as did other counties. It is evident that the county has not concerned itself much with the education of the negro. The value of the school property for the whites increased from $69,213.00 in 1910 to $321,645.00 in 1920, or from $23.58 per child enrolled in 1910 to $74.11 in 1920, while the valuation of the negro property for the same dates were $.89 and $8.66 respectively.

Progress has been made in recent years, but great inequalities still exist in the educational opportunities of the city and rural children. The conclusion is that a larger unit of support and control is needed.

The people are changing their ideas and the schools are being improved in the light of modern practice. Several consolidations have been made and better buildings and teachers secured. It is recommended that the tax burden be equalized for the support of schools, that good four-year high schools be placed within reach of all, that the compulsory law be enforced, and that more consolidation be made.

William E. Drake. The History of Education in Tyrrell County. (August, 1928.) (Under the direction of E. W. Knight.)

The history of education in Tyrrell County, dating before 1800, is marked by few outstanding events. Educational progress as a whole has been slow in development, and today the county ranks low in average with the other counties of the state. As the county is strictly rural, small in population, citizens have found it difficult to meet the minimum school requirements. Periods of prosperity have come only to be swept away by the one-crop system of agriculture.

During the nineteenth century the best educational work in the county was done by the academies, three of which were open at times from 1819 to 1900. Public school progress was evident from 1839 to 1860, but the years of the Civil War and Reconstruction destroyed what had been accomplished. The period from 1868 to 1900 was merely a struggle to regain what had been lost.

Following the spirit of revival awakened by Aycock, the county became active and set up its first organized graded school in the township of Columbia in 1903. Continuing to follow out the plan of reawakening as set by the educational leaders of the state, an act was passed by the county board of education in 1911 whereby two high schools were established in the townships of Scuppernong and Columbia. A lull came in the educational progress during the years of the World War, but in 1921 the administrative officers put into action the country's largest building program, and consolidated various schools.

Edna Deaton Edmonds. Provisions for Kindergarten Training in North Carolina. (August, 1928.) (Under the direction of M. R. Trabue.)

The purpose of this study is to prepare a report and directory of kindergartens in North Carolina as they actually exist in 1929.

The data for this study were obtained by means of questionnaires sent to the superintendents of the eighty-six largest cities in North Carolina. An additional questionnaire was then sent to each kindergarten teacher reported by the superintendents.

The study reveals the fact that the people of North Carolina apparently have not awakened to the values of and needs for kindergartens. Only a few private kindergartens exist, and Asheville is the only city in the state having public kindergartens. A great majority of those teaching kindergartens have not been properly trained for their tasks. Only six teachers hold a kindergarten diploma. These teachers conduct the classes in their own homes and have meagre equipment. A number of teachers who are improperly trained

have had children under their care for approximately five years and expect to stay in the profession.

HOWARD MONTAGUE FINCH. The Relationship Between the Age-Grade Status of High School Pupils and the Amount of Reading Material in Their Homes. (August, 1928.) (Under the direction of M. R. TRABUE.)

The purpose of this study was to discover any relationships that might exist between the age-grade status of children in certain secondary schools and (1) the number of newspapers, books, and magazines that were taken in their homes; (2) the kinds of magazines that were taken in their homes.

The data for this report were secured from questionnaires that had been filled out by 2,078 pupils in the high schools of the following North Carolina towns: Hamlet, Dunn, Stem, Lumberton, Gastonia, Roanoke Rapids, Hope Mills, and Creedmoor. Items relative to the age, sex, grade, number of books in the home, number and names of newspapers in the home, and number and names of magazines in the home were tabulated. Tables were prepared to show: (1) the number of newspapers, books, and magazines in the homes of the accelerated, normal-age, and retarded pupils; (2) the kinds of magazines in the homes of the accelerated, normal-age, and retarded pupils.

From the tables constructed, the following conclusions appeared to be justified: I. Considering the three factors (newspapers, magazines, and books), the clearest relationship existed between the number of books in the home and the age-grade status of the children. II. (a) Of the nine groups into which the magazines were classified, a favorable relationship existed more clearly between the age-grade status of the children and the presence in the home of each of the following groups: "women's magazines," "literary magazines," and "magazines selected by girls only." (b) Little relationship was seen between the age-grade status of children and the presence of either "class magazines" or of the "eight leading magazines" in the home. (c) No relationship was seen between the age-grade status of the children (these were all town children) and the presence of "farm magazines" in the home.

GEORGE HENRY HILL. The Development of a Junior High School Suitable to the Needs of a Small Community. (Under the direction of E. R. MOSHER.)

The purpose of this thesis was to study a junior high school best adapted to the needs of a small rural community.

The information on which this project was based was collected from various sources. A part of it consisted of material from recognized authors found in recent books, magazine articles, official educational reports, government reports and general publications, and the rest of it from data accumulated from personal investigations. Facts from these various sources were used to determine what features were to be used in the development of a small junior high school at Bowersville, Georgia.

The important features incorporated in this school were: (1) a reorganization of the daily schedule so as to provide for supervised study, individual differences in capacities, interests, and aptitudes of pupils, the elimination of the sharp break between the lower and upper grades, and the reduction in the repetition of much school work; (2) a reorganization of the courses of study so as to provide for development in health, worthy home membership, vocation, citizenship, worthy use of leisure, and ethical character; (3) a club program to supplement the courses of study in fulfilling the aims of education; and (4) a vocational department to do specific vocational guidance.

Ralph Wendell Holmes. The School Survey Movement in the United States Prior to 1860. (August, 1928.) (Under the direction of E. W. Knight.)

The purpose of this work is to make a study of school surveys in the United States before the beginning of the Civil War and to see how they differ from modern ones in purpose, methods, and results.

One chapter is concerned with surveys in New England, taking up, in turn, the work of Horace Mann, Henry Barnard, and the Boston School Committee of 1845. In method and purpose these surveys compare favorably with many of our modern studies of state and city systems.

Another chapter takes up the movement in South Carolina. Most of the material is taken directly from the reports of the surveyors, including the work of Elliott and Thornwell, Henry Sumner, R. F. W. Allston, Colonel C. G. Memminger, and the Legislative Committee of 1856.

Other typical surveys bring in the work of Henry Ruffner, Governor Wise, and the Educational Conventions in Virginia; Archibald D. Murphey, Joseph Caldwell, and Calvin H. Wiley in North Carolina; and Caleb Mills in Indiana.

Three more recent studies of North Carolina schools are included—the state surveys of 1920 and 1927, and that of the schools of Elizabeth City in 1920-1921.

From such a study it is concluded that surveys that are coöperative, impartial, and conducted by competent surveyors are useful. When no effort is put forth to enable the public to profit from a survey, little good may be expected from it. It is recommended that in most instances the unit for building and maintaining schools be no less than the county; that a survey of each county be made showing where the people live, in what occupations they are engaged, and the trend of future growth or decline of population in the different communities; and that with this information in hand, buildings be located and constructed and courses of study adopted to suit present needs and also to meet future demands.

Maloy Alton Huggins. High School Libraries in North Carolina. A study of their origin, development, and present status. (Under the direction of E. W. Knight.)

The purpose of this study was to inquire into the origin and to trace the development of the library in the high schools of North Carolina.

A careful examination was made of many original sources, including reports of the United States Commissioner of Education, the State Superintendent of Public Instruction in North Carolina, the proceedings of educational bodies, and the Public Laws of North Carolina.

The study has shown that libraries were begun soon after the establishment of the first "graded" schools in the towns and cities, 1875-1885. Their subsequent growth was stimulated by the rural school library legislation of 1901, the high school law of 1907, the creation of the North Carolina Library Commission in 1909 and, particularly, by the adoption of standards for accreditment by the State Department of Public Instruction about 1922.

The failure of past efforts to procure desirable library service for the schools is due, at least in part, to a lack of sustained interest, a lack of a proper selection of books, a lack of adequate accessioning and accounting—resulting in tremendous losses—and to a lack of necessary financial support. These deficiencies have been met only in those schools in which trained librarians have been employed.

There is need (1) that the University and colleges of the state provide the best training possible and encourage undergraduates to enter this field of work; (2) that the State Department of Public Instruction set qualitative standards in addition to the quantitative standards now in effect; (3) that there be created, in the State Department of Public Instruction, a division of libraries or, in lieu thereof, that state library supervisors, one for the secondary and one for the elementary schools, be appointed, since in the past state aid without state supervision has proved abortive and state supervision without state aid futile.

CLAUDE L. IVES. A Building Principal's Plan of Supervision. (August, 1928.) (Under the direction of M. R. TRABUE.)

This thesis is an attempt to discover the most outstanding problems of the Enfield schools and to organize a constructive plan of supervision that will meet the most urgent needs of the school system.

Standard tests have been used for the purpose of measuring objectively the efficiency of the Enfield system and for the purpose of comparing that system with other school systems. The same type of tests and the same supervision that were used in the Halifax County schools have been used in the Enfield schools. As a result of this work it was discovered that the Enfield schools not only fall below national standards in some of the fundamental subjects, but in some instances the Enfield schools have made a poorer rating than the county schools. The Enfield schools are in session for nine months a year, but have had no method of supervision; the Halifax County schools are in session for six and eight months a year and have been under careful supervision for several years. The equipment and professional training of teachers of the Enfield schools are superior to that of the county schools; still the county schools have made a better rating.

From this study it is evident that effective supervision is absolutely necessary for any school system to obtain the best results.

JAMES BATE JONES. The Adaptability of Our State Elementary School Curriculum to Boys as Compared with Girls. (August, 1928.) (Under the direction of M. R. TRABUE.)

Measurements of 178 boys and 176 girls were obtained in age, reading comprehension, arithmetic fundamentals, arithmetic problem solving, and intelligence. The critical ratio technique was employed to determine whether there was a significant difference between boys and girls in each trait measured in each of grades 4-7.

Direct and partial correlations between traits measured were found to determine whether there were any significant differences between the sexes in the factors influencing achievement.

Conclusions: (1) There is an apparent difference between boys and girls in all factors measured in each grade. (2) The curriculum appears to be better adapted to girls than to boys, but to no significant extent. (3) There are no definite, consistent trends. (4) The correlation between each pair of traits is higher with girls than with boys, indicating that girls do not vary from type so much as boys, and that their achievement in academic subjects conforms better with their intelligence than that of boys. (5) There is no real problem of adjusting the curriculum to the sexes.

OSCAR LEE KISER. Growth and Development of Education in Gaston County. (August, 1928.) (Under the direction of E. W. KNIGHT.)

Gaston County was formed from Lincoln in 1846, with an area of 370 square miles. The history of the county is divided into two distinct periods: (1) from the colonial days to 1872, an epoch of slow progress and development; (2) the erection of several cotton mills and the building of the first railroad in 1872 marked the beginning of the rapid rate of progress which has continued down to the present time. Gaston is nationally known as a cotton textile center, and has more towns within her borders than any other county in the state.

There is evidence that a number of academies and subscription and private schools were in existence before the public school system was established in 1839. The county had a fairly creditable system of schools before the Civil War, but it was retarded and almost destroyed during that conflict and the period of reconstruction which followed. With the beginning of the industrial development in 1872 the county's school system began to show signs of improvement. After 1900 the people became more thoroughly aroused to the cause of education, and since that time the schools of the county have gone forward at a rapid rate of progress. In 1920 a very effective program of consolidation was begun, and today the county has a rather creditable system of consolidated schools. The system would more nearly fit the needs of the children, however, if there were some form of industrial education introduced into the schools located in the cotton mill centers, and if agriculture were taught in the rural parts of the county.

W. T. KNOX. A Health Program for a Rural Elementary School. (August, 1928.) (Under the direction of M. R. TRABUE.)

This program of school health service was developed for a seven-grade elementary school of three hundred and fifty pupils, located in a village in southeastern Georgia. Adaptations were attempted to the geographic location, to the rural school personnel, and to the cultural standards of the people, and consideration was given the previous school health work. Some phases of the program were determined by state requirements, and others were limited by the financial ability of the school district, and by the existing school plant.

The chief objective in the classrooms of the primary grades was the formation of health habits by the use of a daily health story, a morning inspection for cleanliness, games, rhymes, songs, dramatizations, health charts, and health clubs. Attention was also given to mental hygiene and school sanitation, and the feature of the physical education program was a daily period of supervised play.

The aims in the other grades were the exercise of the health habits already taught, motivated by the same devices as in the primary grades, and the teaching of the reasons for good health habits by the use of a series of texts in health and hygiene. The other phases of classroom work were continued as in the primary grades.

Among the significant results were the establishment of the habits of drinking milk and of personal cleanliness, the development of poise and self-confidence in the pupils, the improvement in school attendance despite epidemic diseases, the acceleration of the school progress of a number of pupils, and the arousing of community interest in child health.

GRETA PECK LITTLE. Certain Techniques for the Elementary School Teacher to Use in Deriving Human Geography Principles. (Under the direction of R. W. TYLER.)

The purpose of this study is to find techniques to be used by the elementary school teacher in deriving human geography principles, which are consistent with the aim of geography teaching and the use of which shall guide him toward self-improvement in lesson preparation by means of efficient use of varied materials.

Chapter I states that the techniques must be consistent with the aim of human geography and with the aim of geography teaching. A human geography principle is defined in this thesis as a generalization which shows the way in which man *tends* to adapt himself by utilizing and improving the factors of his environment and demonstrates that the way in which he does this is determined largely by his environment.

The techniques consist of four diagrams. The first deals with all the environment-human responses relationships and forms the basis for the others. The second deals with industrial geography and locations of cities and trade routes. The third one is for the organization of political geography relation-

ships and the last one is for type studies of any of the others. Explanation is made to show how the aim of human geography and the needs of the various curricula and age levels are met.

An annotated bibliography of materials most useful to the teacher and for the children is given in accordance with the use of the guide sheets. Among the children's books emphasis is upon recent source materials and stories with geographic content and value.

These techniques need to be tested out by many teachers and students and subjected to careful, constructive criticism in order to determine their value and to suggest ways in which they may be improved.

Thomas Lee Looper. The Causes of Elimination of Pupils in the Elementary Schools of Gastonia, North Carolina. (Under the direction of M. R. Trabue.)

An attempt has been made in this study of the Gastonia schools to account for the dropping out of pupils before completing the elementary grades.

The method of approach is (1) to secure facts in regard to age-grade and promotions in both the "up-town" and mill schools; (2) to study elimination and retardation, by grades, as shown by the mental status of the pupils and the economic and educational status of their parents; (3) to make a study of sixth- and seventh-grade pupils who remain in school, finding out why they remain, what their future plans are, and the kind of homes they represent; and (4) to make a study of pupils who leave school, finding out why they are leaving, their age, grade progress, and educational achievements, the kind of homes they represent, and what they do after leaving school.

The investigation shows certain tendencies which seem to be very pronounced and indicates that the leading factors contributing to elimination of pupils in the Gastonia schools are: (1) indifference on the part of pupil and parents; (2) failure of pupil and parents to see the economic and social values of an education; (3) over-ageness and retardation; (4) the pupil's mental inability to do the type of work required by our school system; (5) improper classification of pupils; (6) economic, vocational, and educational status of parents; (7) frequent moving of parents; (8) the pupil's lack of a definite purpose; (9) physical defects, such as diseased tonsils, weak eyes, defective hearing, and underweight; (10) misunderstanding among pupils, teachers, and parents; (11) the pupil's eagerness to earn money.

Clarence R. McLain. The Growth and Development of Education in Iredell County. (August, 1928.) (Under the direction of E. W. Knight.)

The purpose of this study is to show the growth and development of education in Iredell County from the formation of the county in 1788 to the present, with a detailed plan for the consolidation of the sixty-two small districts into nineteen community centers.

Several private schools and academies were opened in the county before the Civil War. Crowfield's Academy, established in 1760, was the first classical school. Practically all these academies were supplanted by the public schools soon after the period of reconstruction. The public schools gained considerable foothold during the twenty-year period prior to the Civil War.

The average salary paid teachers in 1853 was $13.14; in 1900, $23.63; and in 1925, $110.00. In 1900 schoolhouses for the whites were valued at $196.65 and $129.33 for the colored; while in 1925, the valuations were $13,565.00 and $3,179.00 respectively. The county has made more progress in the past five years than it has in any previous twenty-year period.

The people of the county are gradually changing their habits, manners, and customs, and are beginning to develop their schools in the light of modern educational practice. Already, many consolidations have been made; and if the proposed plan of consolidation is carried to completion, there will be only nineteen consolidated centers, thus reducing the number of schools from sixty-two to nineteen, and providing better educational facilities for the county.

GUSTAVE ERNST METZ. The Relationship Between Certain Social Factors and School Progress Among High School Pupils in Charlotte, North Carolina. (August, 1928.) (Under the direction of R. W. TYLER.)

The problem of this investigation was to determine the relationship between certain social factors in the life of the child and the progress he made in school work. The data used in the study were secured from 1,771 questionnaires which had been filled out by high school pupils in Charlotte, N. C. The grade in the school system which the pupil had reached was selected as a measure of his persistence in school, and his age-grade status was chosen as an indication of the rate at which he had progressed through the grades. These were the chief measures of school progress used in the study.

Certain important factors in the life of the child were studied in their relationships to school progress. It was found that pupils in the upper grades of the high school came from higher occupational classes of society, lived in homes that had more rooms per person in them, and had more books, magazines, and boys' and girls' magazines in their homes than did students in the lower grades.

With regard to the relationships between the age-grade status of the pupil and the factors chosen for study, there were some differences between the boys and girls which necessitated analyzing the data for the sexes separately. Among the boys, the factors having the highest relationships to age-grade status were the following: the number of magazines subscribed to, or bought regularly, by the family, the occupational status of the pupil's father, the number of children in the family, the educational ambition of the student, and the number of hours per day the pupil spent working. Among the girls, the factors equally as highly related to age-grade status were the following: educational ambition, the number of books in the home, the number of hours per

day spent working, the number of magazines subscribed to, or bought regularly, by the family, the occupational status of the pupil's father, the number of rooms per person in the home, the education of parents, and the number of children in the family.

Egbert Noll Peeler. The Status of the High Schools of Rowan County. (August, 1928.) (Under the direction of M. R. Trabue.)

The purpose of this study is to determine the condition of the public high schools of Rowan County during the school year 1927-1928. A brief historical background is given, showing the type of people who first settled in this territory, as the descendants of these settlers comprise most of the present population.

Data were secured from the reports of the high school principals, records of the superintendents, a questionnaire filled out by the teachers, and numerous personal interviews with superintendents and principals.

Great progress has been made in the high schools of Rowan County, as shown by a comparison of the figures for 1922 and 1928. With one exception, the buildings occupied by the ten high schools are in good condition, and they are fairly well equipped. The greatest field for improvement is in building up a course of study that is more applicable to daily needs, and in employing teachers who are specialists. Gradual improvement has been made along this line for several years and it will doubtless be continued, as all forces are working in this direction.

Philip Basil Pollock. Public Education in Jones County. (August, 1928.) (Under the direction of E. W. Knight.)

The purpose of this study is to trace the history and development of education in Jones County, North Carolina, from the time of the earliest settlements in 1710 to June 30, 1928.

There is no knowledge of the existence of any schools in Jones County until 1807 when the Trenton Female Academy was first established. Nothing else is heard of this institution after 1838. The only other report of any kind relating to schools is known to have been made in 1846, and then nothing else is known of education in the county until the report of Calvin H. Wiley, State Superintendent of Public Instruction, which was made in 1853.

Education in the county made fair progress during the administration of Superintendent Wiley, but the Civil War and Reconstruction retarded it, consequently there was only slight development along educational lines from 1868 to 1900. Gradual improvement in education has been made since 1900, the period of greatest growth being from 1920 to the present time.

The principal needs of the county system of education are: a uniform county plan of education, carrying a uniform tax rate; provision for high school instruction in the upper end of the country; the addition of more territory to the Maysville school district and the erection of an adequate high school building there; more attention to the education of the colored race; the addi-

tion of two members to the county board of education; and a uniform nine months' school term throughout the county.

ROBERT TEMPLE RYLAND. Education in Pasquotank. (August, 1928.) (Under the direction of E. W. KNIGHT.)

The purpose of this study is to trace the history and development of education in Pasquotank County, North Carolina, from the time of the earliest schools to June 30, 1928.

From the time of its earliest school in 1705 until 1853 information concerning Pasquotank schools is scattered and indefinite. Pasquotank did excellent public school work between 1853 and 1865, during the administration of Calvin H. Wiley as state superintendent. For a part of this time the school term was more than six months, and the average monthly salary thirty dollars. Both of these items were far above the state averages at that time. The Civil War and Reconstruction retarded and discouraged progress generally, and consequently there was a limited development in education in Pasquotank from 1868 to 1900.

In the twentieth century substantial improvement in education has been made. Teachers' salaries have increased from less than $30 to more than $100 a month, the school term from five to more than eight months, the value of school property from about $15,000 to more than $700,000, and the total school expenditures from $9,500 to more than $340,000. All of the white rural pupils are attending three good consolidated high schools instead of twenty-two small schools as in 1900; there are excellent high school facilities in Elizabeth City for white and colored children, and there is a growing sentiment in favor of educational improvement.

The principal needs of the county are: better supervision, a curriculum more nearly suited to the needs of the pupils, some provision for high school work for the Negroes in the rural sections, a uniform nine months' school term throughout the county.

JOHN E. SAWYER. Survey of the Pamlico County Schools. (Under the direction of M. R. TRABUE.)

The purpose of this study is to find the actual present status of the schools of Pamlico County, North Carolina. It naturally divides itself into three phases: buildings and equipment, work of the schools, and the teaching force.

The five high school plants were scored according to the Strayer-Englehardt scoring scheme for school plants. Each plant was inspected and ratings were carefully made on the scoring card.

The work of the schools was determined by the use of standard tests in the second, seventh, eighth, and eleventh grades. Fortunately it was possible to compare the school work as revealed by these findings with the findings from several thousand other North Carolina children taking the same tests. That gave opportunity for very definite conclusions concerning the work of the schools in the county. No tests were given in the ninth and tenth grades. The second, seventh, eighth, and eleventh grades constitute a fair cross-section of the work.

Only the teachers in the high schools were studied. This study of them was made from the records of the high school principals' reports and the reports of the county superintendent covering a period of several years. The data relative to the present high school teachers were secured by questionnaires to the high school principals.

Mary Elizabeth Smart. Provisions in the North Carolina Public Schools for the Mentally Handicapped Child. (Under the direction of M. R. Trabue.)

The purpose of this investigation is to find what provisions have been made in the public schools of North Carolina for the mentally handicapped child.

The information and data for this study were obtained by means of questionnaires, which were sent to the superintendents of schools in 100 cities in North Carolina. If the superintendents reported special classes, a further questionnaire was then sent to the teacher of the special class.

The plan of treatment is as follows: First, a chapter stating and explaining the problem, followed by a chapter which gives the definition and meaning of special classes as used in this study, the characteristics of the pupils of this class, and the aims of the class. Chapter III is on the special classes in North Carolina, with a table showing the number of classes, number of pupils, and date established. The next chapter describes the methods used in selecting children for these classes with charts presented to show the differences in age and I. Q. in a class. Chapter V analyses the type of education given in these classes. Chapter VI is a study of the training, experience, and preparation of the teacher. This is followed by a chapter which sums up the main points of the study.

DEPARTMENT OF ENGLISH

Norman Foerster has published:

Wordsworth in America. *Studies in Philology,* January, 1929.

A review-article based on Annabel Newton's *Wordsworth in Early American Criticism.*

American Literature, in American Bibliography for 1928. *Publications of the Modern Language Association,* March, 1929.

The American Scholar: A Study in *Litterae Inhumaniores.* University of North Carolina Press, 1929.

Expansion of a paper read before the Graduate Club in October, 1928, and before the Philological Club in January, 1929. This study deals with the effect on literary scholarship of the romantic movement and especially of the scientific movement of the past century. It considers the creation of the science of language, the creation of a new literary history, the distorted emphasis on literary history, the tendency to worship facts, the tendency to pass beyond the limits

of literary history into general history, the premature exploitation of psychology in literary study, the aversion from literary criticism by scholars who themselves employ conventional or impressionistic criticism. It then maintains that a humanistic criticism is the primary need today, both to render possible a more thorough literary history and to achieve the task for which literary history, like linguistic study, is a stage of preparation. This will involve a reorientation, in particular, a turning from Germany to France for a profounder conception of literary scholarship. It will also involve a reorganization of the graduate school.

PROFESSOR FOERSTER has edited:

The Reinterpretation of American Literature: Some Contributions toward the Understanding of its Historical Development. Harcourt, Brace and Co., 1928.

This book, edited for the American Literature Group of the Modern Language Association, contains an introduction by the editor, nine articles (number II, Factors in American Literary History, by the editor), and two bibliographies.

PROFESSOR FOERSTER has in preparation:

A symposium on humanism to be published by Doubleday, Doran Co.

Articles on impressionistic criticism and on the relation of creation and criticism, probably to be included in a book on contemporary criticism.

American Critical Essays. An addition to the World's Classics series, with an introduction distinguishing the schools of American criticism from Poe to the present. Oxford University Press.

John Burroughs. *Dictionary of American Biography,* Vol. III.

GEORGE C. TAYLOR has completed an investigation of the Influence of the Dialogues of Heraclitus and Democritus on the Dialogue of Act I, sc. 1, of *The Merchant of Venice.*

PROFESSOR TAYLOR has in preparation the following studies:

The Title-Pages of Elizabethan Plays.

The investigation seeks to determine mainly the relation of the title-pages of one and the same play to each other and to the play itself.

Further Evidences of the Vogue of Du Bartas in England.

Agricola's *De Re Metallica* and the Attitude of Certain English Renaissance Poets towards Mining of Metals.

The Date of Capell's Notes and Various Readings to Shakespeare, Vol. II.

Howard M. Jones has published during the year:

The Poems of Edgar Allan Poe, edited and with an introduction. The Spiral Press, 1929.

During the year he read before a joint meeting of the Philological Club and the Erasmus Club of Duke University a paper, entitled The Disreputable Century, designed to correct certain current misconceptions of nineteenth-century literature and to place its development in a proper historical perspective.

In April, 1929, he delivered three lectures on "America and French Literature, 1750-1848" at the University of Michigan, giving the results of some of his researches in the field of American interest in French letters. The first of these was designed to ascertain the causes of the general American distrust of French literature. The second exhibited some of the evidence for an American knowledge of French literature in the period. The third indicated the moral bias of American critics in appraising French fiction.

In addition to continuing the research projects outlined in the previous bulletin, he is at work on a text of the sonnets of Henry Wardsworth Longfellow and is acting as general editor of The Spiral Press series of texts in American literature.

Gregory Paine is writing a biographical and critical study of James Fenimore Cooper as an interpreter and critic of American life.

W. D. MacMillan III has published during the year:

The First Editions of Home's *Douglas*. *Studies in Philology*, July, 1929.

A study of the text of early editions of John Home's *Douglas*, suggesting the superiority of the Edinburgh 1757 edition over the first London edition of 1757.

Professor MacMillan has also been engaged in studies of the texts of various eighteenth-century plays in preparation for an edition to be published in collaboration with Howard M. Jones. (Announced for publication by Henry Holt and Company.)

LOUIS B. WRIGHT has published during the year:

The Scriptures and the Elizabethan Stage. *Modern Philology,* XXVI: 47-56. 1928.

Offers proof of the popularity of biblical themes in the Elizabethan public theatres.

Vaudeville Dancing and Acrobatics in Elizabethan Plays. *Englische Studien,* LXIII: 59-76. 1928.

A discussion of extra-dramatic entertainment inserted in plays of the period.

A Political Reflection in Phillip's *Patient Grissell. Review of English Studies,* IV: 424-428. 1928.

Points out dramatic allusions to the question of Elizabeth's marriage.

MR. WRIGHT has under way certain studies in the reflection of contemporary social and political ideas in Elizabethan drama. He is also completing a study of Elizabethan middle-class literature and culture.

RAYMOND ADAMS has published during the year:

Thoreau and Immortality. *Studies in Philology,* XXVI: 58-66. January, 1929.

This paper presents some unpublished Thoreau journal entries and letters, and advances the idea that Thoreau was much concerned about the hereafter and about the origin and destiny of his own soul.

To the *Dictionary of American Biography* PROFESSOR ADAMS has contributed the article on Frederic Henry Hedge (in press), and is writing articles on other American transcendentalists for subsequent volumes.

PROFESSOR ADAMS is engaged upon two major projects of Thoreau research:

The editing of Thoreau's college essays from the original manuscripts for the Spiral Press.

The collection of materials for a definitive biography of Thoreau.

The following doctoral dissertations were accepted by the Department during the year:

ABNER WELLINGTON KELLEY. Music and Literature in the American Romantic Movement. A study of the knowledge of, use of, and

ideas relating to the art of music in Emerson, Hawthorne, Longfellow, Poe, Thoreau, Lowell, Whitman, and Lanier. (Under the direction of Norman Foerster.)

This dissertation considers three closely connected problems: (1) what was the knowledge of the art of music possessed by eight major American romanticists; (2) what interest in musical and comparative aesthetics was displayed by these writers; and (3) what were the relationships between this interest and similar interest in aesthetics in other countries. The introductory chapter contains important ideas about music and the related arts held by writers who preceded the Americans that are to be studied more intensely. It deals with the attitude toward music found in the classic Greek and pseudo-classic English periods, and the various attitudes towards music and poetry found in the German, French, and English romantic writers. To show the change in emphasis of musical ideas in America, a section of this introductory chapter has been given to early American ideas relating to music and poetry.

After the background chapter, the dissertation is directly concerned with eight major American romantic writers and their attitudes toward music. These eight men—Emerson, Hawthorne, Longfellow, Poe, Thoreau, Lowell, Whitman, and Lanier—are among the most typically romantic of our writers and know and use music more than any other important American writers. The second chapter covers the associations of these men with music and with the music literature of their time, their opportunities in music, their musical acquaintances, their ability at music criticism, their active participation in the art of music, and their reading in music literature. The third chapter treats their musical vocabulary, showing the extent and correctness of their technical musical terminology, their definitions of music, their use of music metaphors and similes, the effectiveness of their use of musical terms to appear learned, to change the tone, to heighten effects, or to create humor. The fourth chapter treats the relationships between music and nature as noted by these men, dealing with their philosophy of the universality of "music," harmony, and concord in nature, with their philosophy of the imitation of nature by music ((1) the possibility of such imitation, (2) the value of program music, and (3) the comparative value of the sounds of the natural world and music as to beauty). The fifth chapter treats their aesthetic theories of music and related arts, dealing with the "cult of the voice"; with the province, the ranking, and the *mélange* of the arts; and with the effect of music upon the soul as shown by the responses of the intellect, emotions and senses, and the will.

The appendix contains an analytical table of all musical references to be found in the works of the authors studied, by means of which the scattered material concerning each author may readily be brought together. The bibliography, containing about 350 entries, not only concerns the authors under special consideration, but also includes numerous items relating to the history of music, the theory of music, and the relationship of music to literature and life. There is also an index of proper names.

KATHARINE ELIZABETH WILSON. Old English Poetic Traditions and Conventions in Layamon's *Brut*. (Under the direction of J. F. ROYSTER.)

The purpose of this thesis is to make a detailed study of some of the obvious relationships between Layamon's *Brut* and Old English heroic poetry. The resemblance of the *Brut* to Old English poetry is apparent to even the casual reader, and it has been commented on by editors and literary historians from Sir Frederic Madden to J. S. P. Tatlock. The resemblances mentioned by most of the writers are Layamon's native vocabulary and his fondness for battle scenes. Taking these topics as a cue, we made a careful study of them and then investigated certain other topics.

In the study of the vocabulary of the *Brut* a detailed comparison of the two versions—*Ms. Cott. Colig.* (c. 1204) and *Ms. Cott. Otho* (c. 1250)—was made and all differences in vocabulary noted. It was found that many words were always changed in the second version, and many others were usually changed. Investigation of the derivation of these words revealed the fact that many of them were words found only in Old English poetry. Others, like *aðele,* which were found in both prose and poetry, were evidently archaic by 1200 and were, therefore, not used by a later scribe. The grammatical forms of the first version were found, moreover, to be almost exactly like those of Old English; whereas those of the later version were like those of later Middle English. There is sufficient evidence to show that Layamon was following not the language of the early thirteenth century but an older literary language.

A detailed analysis of Old English battle scenes was used as a basis of comparison for the numerous battles recounted by Layamon. In general, he follows the conventional plan for a battle except that he omits the battle animals that are found in the Old English poems that deal with conflicts. As a rule, too, Layamon tends to "out-Herod Herod" in the fierceness and bloodthirstiness of his battles.

The importance attached to the battle hero-king in early Germanic poetry is found in the *Brut* in connection with Arthur and several other heroes. The characteristics of the Old English king were arrived at after a study of *Beowulf, Exodus, Brunanburh, Maldon, Finnsburh,* and other poems where warlike leaders play an important part.

The only rhetorical device studied was hyperbole, under the division of superlatives, phrases with *unrim* or *unmæte,* and extreme statements. It was found that all hyperbole was used generally in connection with power or splendor, treasure, marvels, emotional states, and praise of people. In this respect Layamon follows Old English poetry quite closely.

The general conclusion reached was that Layamon must have been familiar with Old English poetry and that the differences between the versions are due not to a great change in the language during fifty years but to Layamon's conscious archaizing and conformity to the standard forms of an earlier age.

The following master's theses were accepted by the Department during the year:

Frances Marion Alexander. The Reflection of Courtesy-Book Subjects in Shakespeare's Comedies with Subject Indices to *The Courtier, Galateo* and *Civile Conversation.* (Under the direction of G. C. Taylor.)

The purpose of this thesis is to show that Shakespeare, in his comedies, deals with many of the same subjects that are treated in the sixteenth-century courtesy-books.

The method used is the presentation of subject indices of Castiglione's *The Courtier,* Della Casa's *Galateo,* and Guazzo's *Civile Conversation,* the three most representative courtesy-books of the century, which indices are compared to an outline of material on courtesy-book subjects in Shakespeare's comedies.

The results of the comparison show that Shakespeare's court lady and his gentleman are in many respects similar to the ideal lady and the perfect courtier of the courtesy-books, and that Shakespeare's wit combats, debates, and conversations upon education are apparently indebted to those in the books of courtesy.

Kate J. Carmichael. Herman Melville's Literary Reputation. (Under the direction of G. L. Paine.)

The purpose of this thesis is to trace the literary reputation of Herman Melville from the publication of his first book, *Typee,* to the publication of the recent biography of him by Lewis Mumford. Melville's reputation falls into three fairly well defined periods. The first, from 1846 to 1857, embraces the period of his greatest literary activity. This begins with a brilliant success following the publication of *Typee* and ends in disappointment to the public and defeat for Melville. The second period, from 1858 to about 1918, extends over many years, as it was during this time that Herman Melville's reputation went into a long eclipse which apparently reached its darkest in the eighties, and then slowly, and at first almost imperceptibly, began a rise that culminated in 1914 with the publication of the first long study of Melville's *Moby-Dick,* and is reflected in the changed attitude of the literary histories from this time to 1919. With the centennial of his birth in 1919 begins the present period of Melville's reputation. From a few appreciative articles during that year, the interest in Melville, furthered by quoted remarks of certain literary celebrities, now rose rapidly and, with the publication of Raymond Weaver's biography and the first standard edition of Melville's works, review followed review and Melville's name again became well known to the literary world.

The plan followed in this study is a chronological presentation of significant critical material showing the rise, fall, and rise again during the different periods. Attention is directed to the different tendencies prevailing during these periods, with the idea of indicating the reason for the fluctuation of Melville's reputation and his probable future place in American literature.

ELIZABETH BOSTICK ELMORE. Traditionality of Chaucer Note-Making. (Under the direction of J. F. ROYSTER.)

The purpose of this thesis is to show how four great Chaucerian editors—Speght, Urry, Tyrwhitt, and Skeat—have attempted to clear up the difficult passages in Chaucer with the same explanations. Speght's 1602 edition is the first to be considered. Chapter I points out Urry's use of Speght's notes as the basis of his glossary, and also Urry's contributions to Chaucer elucidation. In Chapter II Tyrwhitt's slight use of Speght and his great dependence upon Urry's glossary are taken up. In Chapter III Skeat is shown to have used Speght directly, Urry indirectly through Tyrwhitt, and Tyrwhitt as a principal source. The appendix contains the classified notes of Tyrwhitt and Skeat on the "General Prologue" and the "Knight's Tale" in parallel columns.

In conclusion, it is found that each of these editors shows a marked dependence upon the preceding editor or editors. Thus, Urry drew material for his glossary from Speght's glossary; Tyrwhitt, from Speght and Urry; Skeat, from Speght, Urry, and Tyrwhitt.

VIRGINIA MORING MCDANIEL. Rousseauistic Traits in Wordsworth's Poetry Prior to 1805. (Under the direction of NORMAN FOERSTER.)

The problem of this paper is not to prove any direct influence of Rousseau on Wordsworth, but to draw parallels between the ideas of the two men. The questions discussed have been divided as follows: I. Natural Goodness (the noble savage, natural education, simplicity); II. Feeling Versus Reason (romantic treatment of nature, the autobiographical element).

The method of investigation has been to read important works of both men and to compare Wordsworth's early poetry with Rousseau's most characteristic utterances. The standard works of scholars have also been consulted.

General conclusions reached in the first group are, that both Rousseau and Wordsworth believed in the natural goodness of man, though they differed in their application of this belief. The former thought that to attain perfection, man must follow the dictates of his reason (intuition), or nature, the path of least resistance, and not the dictates of his conscience, which has been artificially trained and is therefore evil. His intuition is native and divine; in following it, his *belle âme* cannot err. This view of natural goodness Rousseau repudiated in the *Émile* by insisting that the growing boy should be surrounded by only the best of people who should teach him by their exemplary lives.

Wordsworth's belief in natural goodness was both saner and more practicable than Rousseau's. He accepted Rousseau's theory in regard to the deeds of men outside the law, but he differed from his predecessor in that he let his criminal characters suffer retribution, instead of exonerating them because they had followed their own instincts. However, he does not put the blame on them, but on society. Wordsworth had more faith in the natural goodness theory than had Rousseau; he had no sympathy with Rousseau's precautions for the child. To him, innate goodness was real.

In the second group, we may sum up the conclusions by saying that Wordsworth, like Rousseau, had unbounded confidence in his innate feelings, but, unlike him, he possessed a restraint which he allowed ultimately to triumph over his instinctive desires.

WILLIAM JOHN OLIVE. Shakespeare in Relation to Literary Satire and Burlesque in Elizabethan Drama. (Under the direction of G. C. TAYLOR.)

Only literary satire and burlesque which occur in Elizabethan drama are considered in this study.

In the first chapter a background for the consideration of literary satire and burlesque in Shakespeare is built up by taking for detailed study available plays by other dramatists which were known to contain considerable satire. In this section are treated the various types of literature that are most frequently satirized in the drama: the romances, euphuism and literary affectation, the sonnets, the fustian drama of the type of *Tamburlaine* and *The Spanish Tragedy,* and other types satirized. In the second chapter the satire or burlesque of other literature which occurs in Shakespeare's plays is considered. In general, Shakespeare is found to have the same objects for satire as his contemporaries. He satirizes literary affectation such as euphuism, burlesques the older drama and the fustian plays of Marlowe and others, and burlesques the humour plays of Jonson. Satire of other types of literature occurs less prominently in his plays. Shakespeare's satire is never found to be personal or bitter as is that of some of his contemporaries. In the final chapter an effort is made to collect the instances of satire or burlesque of Shakespeare's plays and poetry which occur in the drama of the time. These instances are found to be far less frequent than serious borrowings. They never indicate an unpleasant picture of the man personally, and are usually in the spirit of good-natured travesty or parody brought into plays more or less incidentally. No complete dramas burlesquing his plays are found during the period.

WILLIAM ANDERSON OLSEN. Francis Bacon's Ideas on the Aim of Learning. (Under the direction of A. C. HOWELL.)

Although Bacon contradicts himself on the subject of the purpose, if any, of learning, the total evidence supports the view that he considers learning a means to an end, not a self-sufficient end in itself. This final aim or end of knowledge is the relief of man's condition through practical discoveries that can be applied to man's use.

Bacon's enthusiasm for science, his desire to persuade an individualistic age to take a social view of knowledge, his brilliant but misleading figurative language—all have contributed to a misinterpretation by certain commentators and scientists of his attitude toward learning. He uses such terms as "contemplative" and "speculative" in an active sense very different from ours; and his much quoted metaphors exalting "experiments of light" over "ex-

periments of fruit,'' on close examination, do not support a knowledge for its own sake ideal, but merely argue the practical advantage of a bountiful, long-time utility over a self-defeating haste for immediate practical results.

The introductory chapter of the study gives a brief summary of attitudes toward learning from the Greeks down to Bacon's own time. The main body examines Bacon's explicit and implicit statements, and considers particularly his treatment of mathematics and astronomy, and the position of learning in the research college in his ideal state, *The New Atlantis*. The appendix illustrates differences of opinion among commentators, and contains a brief discussion of the march of the doctrine of utility after Bacon.

ANNETTE MAY OSBORNE. The Contribution of Shakespearean Actors to Shakespearean Criticism. (Under the direction of G. C. TAYLOR.)

It has been the purpose of this study to show that the actors of Shakespeare's plays have made a contribution both direct and indirect to Shakespearean criticism. The data here presented show that the actors' contribution to criticism consists in actors' interpretation of rôles, editions, and versions of plays, critical essays and books about Shakespeare's art and his work as a whole, detailed essays on single plays and on single characters, poems, dedications, and addresses. Though some of the actors' criticism is merely eulogistic, most of it appears to be worthy of being classed with the best of literary criticism.

HARRY K. RUSSELL. An Inquiry Into the Nature of Comic Effect. (Under the direction of G. C. TAYLOR.)

Since studies of English comedy are often vague and unsound because the critic possesses no definite idea of what constitutes the comic, this study proposes to review a sufficient number of the existing discussions of the comic to permit a determination of the more outstanding theories, to discard those which seem to be farthest from the truth, and to attempt to combine the remainder into a theory of the comic that will be satisfactory. Representative statements are taken from the Greeks, the Romans, the Middle Ages, the Renaissance (Continental and English), the Restoration, and the Eighteenth Century, and from more recent writers. In attempting to organize the theories which have been advanced, certain fairly well defined groups of ideas are found: among them there are statements that the comic is based upon the perception of a defect which is not painful, upon the familiar, upon incongruity, upon a feeling of superiority, upon the recognition of a mechanical quality in man, and upon a fundamental instinct. From a synthesis of the existing theories the following concise (and therefore only approximate) statement is deduced: comic effect resides in a recognition of the not painful familiar in an unaccustomed relationship.

Evelyn Snider. The Change in Wordsworth's Thought in 1805. (Under the direction of Norman Foerster.)

A study of Wordsworth's thought in 1805 reveals a definite change from an attitude of romantic naturalism to one of humanism. Wordsworth's development from early childhood through 1804 is characterized by an enthusiasm for nature which leads to humanitarianism, in his love of mankind and mystical naturalism, in his love of the divine. The death of his brother John in 1805 caused Wordsworth to reconstruct his ethical outlook and to move in the direction of two great traditions, the humanistic and the religious. Wordsworth realized at this time that man is subject to a higher law than that which governs the purely natural world, that man's concern should be for his human ness rather than for his naturalness, and that man is truly free only as his lower natural self is subject to his higher ethical self. His new religious attitude is expressed in his conception of the divine, not as a Being in nature, but as a personal God. He therefore accepts, in part at least, the tradition of Christianity. This change had been prepared for in 1802 by the influence of his break with France, when he realized that freedom can be found only in the soul, his turn to the faith and morals of Milton, and his contact with the transcendentalism of Coleridge. The change from romantic naturalism to the traditions of humanism and religion was not complete. He could not give up his former faith in nature, yet when he tried to return to that faith, he found it inadequate. Consequently his poetry after 1805 lacks both the "abundant recompense" of 1798 and the steady faith of 1805, and is characterized by a somewhat uncritical acceptance of orthodoxy and convention. Except for a few isolated cases, Wordsworth failed to continue in the two great traditions of human thought of which his 1805 attitude had given promise.

Herman E. Spivey. A Critical Bibliography for the Years 1917 to 1922 of Representative American Authors. (Under the direction of G. L. Paine.)

This is a critical bibliography of works by Americans published between January 1, 1917, and January 1, 1922, about the best American authors. Works of about one hundred and eighteen American authors were sought, and those found were read and commented upon. Volumes I, II, and IV of the four-volume *Cambridge History of American Literature* contain bibliographies of American literature up to 1917. *The Publications of the Modern Language Association* contains each year a bibliography of American works about American literature; these annual bibliographies began in 1923 (bibliography for 1922). The years 1917 to 1922 have never before been covered by any bibliography of American literature. This work, therefore, supplies a need in the field of American bibliography.

WILLIAM LESTER WILSON. A Problem in Byron's Prosody. (Under the direction of H. M. JONES.)

This study of Byron's Romantic Tales written in iambic tetrameter, seeks to discover the function of rime-variation and the degree to which it may indicate Byron's prosodic methods and powers. Rime-variation is found to be one of several methods used to relieve the monotony of four-stress iambic verse and the method which finally dominates in these poems. In the sequence of the poems concerned, rime-variation was introduced somewhat gradually, experimentally, was used exaggeratedly, was almost abandoned, and was reintroduced and finally perfected as an artistic instrument. Byron seems to have developed his thought and organized his rime under the influence of a few fundamental forms, as shown in the couplet, triplet, and quatrain; larger rime-units may be explained as fusion or combination of two or more of these forms. The nature and use of rime-variation challenge the common opinion that Byron was not willing or able to give his lines—often if not always—the careful attention of a skilful craftsman. Finally, mastery of rime-variation is seen to parallel and illustrate Byron's growth toward prosodic maturity.

DEPARTMENT OF GEOLOGY

During the year COLLIER COBB presented the following papers:

Aeolian Sand and Oil-Bearing Strata in Sakhalin. Presented at the North Carolina Academy of Science, Greensboro, May 10, 1929.

As petroleum geologists all know, *aeolian* is a name given to a kind of wind-blown sand found in oil-bearing strata. The coarsest aeolian sands are the largest oil-yielders, and from deposits of this kind practically all of the big Baku spouters have been obtained. The oil does not originate in the wind-blown sands. It is only stored there, being driven upward into such sands by the metamorphism of underlying organic deposits. Sometimes these may be animal forms, as fish remains in the petroliferous calcareous shales of the Green River district of Wyoming, in which the fossil fishes show every bone of the skeleton preserved. Again the oil may be derived from plant forms, as seen in peat deposits in marshes where partial decomposition of plants has taken place amidst much moisture, and this may account for the presence of ozokerite in some of the peat mosses of Russia. But attempts to obtain inflammable oils, burning gas, tar, etc., from the destructive distillation of peat have never been successful in a practical way. The fields of Karafuto indicate that Nature's processes are more successful than anything that man has been able to do in his laboratories.

But most geologists are firmly of the opinion that all rock oils are of organic origin; and Credner was strongly inclined to classify petroleums with guanos on account of a similar organic origin. Antoine LeBel acknowledged the organic origin of all rock-oils; but was satisfied that the forces producing them could not come into play except under the influence of a reaction originating in other strata than those bearing the petroleum.

All of this is well illustrated in the strata under consideration. Karafuto, or more properly Sakhalin, is a long and somewhat narrow island running north and south, lying close to the east coast of Siberia. Its area is 30,000 square miles, one half belonging to Japan and the other to Russia.

The island has its mountains, hills, and valleys, with intervening plateaus and flat plains. It is largely covered with fertile soils and forest lands; but it also has extensive peat bogs and vast swamps. Large areas of these swamps are impregnated with oil. This is not a local deposit, but extends along the eastern coast, particularly along that of Russian Sakhalin. The chief oil-bearing deposits of this region are in the Nuroto and Botesa fields. The inland movement of the dunes over the peat beds has compressed the land on the shore line and caused the strata to buckle up before the advancing sand-wave, as observed in the Ichigo Oil Field at Niigata, Japan, and already reported.

The same action of the sand-wave in causing the upbuckling of the strata was noticed by Berendt on the Baltic Sea and is recorded in his *Geologie des Kurischen Haffis* (Königsberg 1869, pp. 18-20), in which he remarks that he has 'observed on the Kurische Nehrung the disturbing influence of a steep dune by unilateral pressure upon underlying marl deposits.' In the case to which he refers, the "Mergelboden" of the Haff that 'has been pressed upward at the foot of the steep dune to a height of five m.'

Vegetation on the Loam-Loess Soils Along the Mississippi from Cairo to Baton Rouge. A Report of Progress. North Carolina Academy of Science, Greensboro, May 11, 1929.

Cliff and Cave Dwellings and Petroglyphs along the Tuckasegee, Little Tennessee, and Nantahela Rivers in North Carolina. Elisha Mitchell Scientific Society, May 14, 1929.

In the summers of 1881, 1882, and 1883, these cliff-dwellings were visited in company with Suate Owl; George W. Bushyhead, the deposed chief; and Nimrod Jarratt Smith, then chief of the Eastern Band of Cherokee Indians. All three stated that their forebears had used these caves as permanent habitations, and that they had been inhabited by men who were there before the Indians came. They also said that the petroglyphs told the story of the settlement of the aborigines, but that none of the Indians could read their writings.

Many of the cliffs and all of the inscriptions found have been photographed and I have tried to prevent any digging on the floors of the caves until some one properly trained for the work could undertake their investigation. My interest in the matter is that of the human geographer—not the archaeologist.

A Small Fossil Elephant from the Everglades of Florida. Elisha Mitchell Scientific Society, May 14, 1929.

WILLIAM F. PROUTY has published during the year:

Geological Report and Map of the Rocks of Pendleton County, West Virginia, Older Than the Clinton, as part of "Report on Pendleton County, West Virginia," *West Virginia Geological Survey*, September, 1928.

The report on the geology of Pendleton County covers parts II and III of the report from pp. 60-104, and is descriptive of the rocks, beginning at the top with the Medina sandstones and ending with the thick bedded massive limestones and dolomites of the Cambro-Ordovician. These rocks occur in the portions of the county with the highest elevations, due to the very resistant character of the massive Medina sandstones and the correspondingly easily weathered character of the older rocks.

One of the most notable structural features of the area studied in Pendleton County is the extensive low angle fault which is exposed in some of the more deeply dissected limestone valleys in the western portion of the county.

The geological map accompanying the report is on the scale of one inch to the mile and covers an area of approximately 700 square miles.

PROFESSOR PROUTY continued during the year his studies of the Triassic rocks of the Durham Basin. He is also directing the following field investigations:

Geological Field Mapping of the Area Immediately to the Southwest of the Gold Hill Area, N. C. (field work by Carl B. Brown).

Structure and Stratigraphy of the Catawba Mountain Area, Virginia (field work by T. L. Kesler).

Slates and Other Building Materials of East and Central Tennessee (field work by H. C. Amick).

J. H. SWARTZ has continued his studies of the Chattanooga black shale of the eastern United States under a grant from the Rockefeller Fund for Research in Pure Science.

During the year PROFESSOR SWARTZ published:

The Age and Stratigraphy of the Chattanooga Shale in Northeastern Tennessee and Virginia. *American Journal of Science*, XVII: 431-448. 1929.

1. The Chattanooga shale can be traced from Big Stone Gap, Virginia, via Sneedville, Tennessee, into the Clinch Mountain area between Rutledge and Klondyke, Tennessee.

2. It shows everywhere the same threefold division observed along the Cumberland Escarpment: (1) an upper black shale, the Big Stone Gap mem-

ber, (2) a middle gray, pure to sandy shale, the Olinger member, and (3) a lower, here very sandy black shale, the Cumberland Gap member.

3. A characteristic Mississippian fauna is found in the Olinger shale, which is thus Mississippian in age. The overlying Big Stone Gap member is therefore Mississippian also. Since the upper part of the Cumberland Gap member intertongues with the Olinger member, it, too, is Mississippian in age. Although the Cumberland Gap member appears to be a unit lithologically, the age of its lower part cannot yet be asserted. With this possible exception, the Chattanooga shale of Tennessee and Virginia is Mississippian throughout.

4. The Grainger formation in the type area, Grainger County, Tennessee, is entirely Mississippian in age.

5. The Cumberland Escarpment and Clinch Mountain areas were not separate basins of sedimentation during Chattanooga times.

Devono-Mississippian Boundary in Virginia and Tennessee. Geological Society of America, New York City, December 27, 1928. Abstract in the *Bulletin of the Geological Society of America,* XL: 93. March, 1929.

In 1927 the Chattanooga shale was shown by the writer to be entirely Mississippian in age in the type area and also throughout much of northeastern Tennessee. The Chemung was thought to be missing, and the Devonian and Mississippian were therefore regarded as separated by a considerable hiatus. Recent work by the writer proves that:

1. The Chemung is *not* missing from this area but passes laterally to the southwest into beds of portage facies which are, however, equivalent to the more normal Chemung of the Saltville area.

2. The Chattanooga, the Chemung, and perhaps even a part of the Portage all merge at the southern end of Clinch Mountain into a single black shale series. The same lithology and environment are found on both sides of any stratigraphic break which might be present.

3. The southward overlap of the Devonian is continued through lower and middle Chattanoogan time. There is no withdrawal, noticeable break, or change in the transgression of the sea as it passes from beds with a Chemung fauna to beds with a Cuyahogan fauna.

The presence of the Chemung, the identical environments on both sides of the boundary, and the continued transgression of the sea across the boundary all show that any break between the Devonian and the Mississippian must be slight.

4. The lower part of the Cumberland Gap member of the Chattanooga shale in its northern exposures is Chemung in age, the Devono-Mississippian boundary lying within this member; but the writer could not separate the Devonian from the Mississippian portion of the Cumberland Gap member except in the area about Kermit, Virginia. If such differentiation becomes practicable, the Devonian portion of the member should be removed as a separate formation

and the name "Chattanoogan" restricted to the Mississippian part, since that part alone is developed at Chattanooga.

PROFESSOR SWARTZ is continuing his studies of North Carolina foraminifera and his statistical investigations of the Brachiopoda.

During June, he was engaged in geophysical research with the United States Bureau of Mines in the region about Mammoth Cave, Kentucky, and in western Edmonson County, Kentucky.

GERALD R. MACCARTHY has published Tourmaline-Bearing Quartz from Amelia, Virginia. *American Mineralogist,* XIII: 531. 1928.

He has read the following papers:

Unstable Continents. Elisha Mitchell Scientific Society, December 11, 1928.

A Modification of the Theory of Magmatic Cycles. Geological Society of America, New York, December 27, 1928.

DEPARTMENT OF GERMANIC LANGUAGES

E. C. METZENTHIN is gathering material for his contribution to the Goethe anniversary book to be published in 1932 under the auspices of the Modern Language Association of America.

He used his stay in Germany during the summer of 1928 to discuss with German scholars the problems connected with his topic, Goethe and the Lutheran Church, as well as details in regard to the editing of a paleographic reprint of the parallel passages in all four extant MSS of the Old Saxon Epic, *The Heliand.* He is enlarging the field of his research by studying Germanic MSS of the ninth and tenth centuries in order to fix, as far as possible, the probable times of the *Heliand* MSS by comparing minutely the make-ups of those early MSS.

DEPARTMENT OF HISTORY AND GOVERNMENT

R. D. W. CONNOR has published North Carolina: Rebuilding an Ancient Commonwealth. Two volumes, covering the history of the state from 1584 to 1925. American Historical Society, Inc., Chicago, 1929.

W. W. PIERSON, JR., has in preparation a volume on The Constitutional System of Venezuela, which is based on research study

done in that country under the auspices of the Carnegie Institute of Washington. He has ready for publication a monograph on Foreign Influences on the Political Thought of Venezuela and an article on Francisco Arango y Parreño.

M. B. Garrett and W. W. Pierson, Jr., plan the publication of a critical edition of Abbé Siéyès' *Qu-est-ce que le Tiers Etat.* The translation has been completed by Professor Garrett, and the essay on the political theory of Siéyès will be prepared by Professor Pierson.

Fletcher M. Green has completed the study of Constitutional Development in the South Atlantic States, 1776-1860, outlined in *Research in Progress,* October, 1927. (In press.)

Professor Green has finished a study of the rise of military schools in the Old South. At present he is engaged in an investigation of the gold mining industry of the southern states prior to the Civil War. He has been awarded a grant-in-aid by the Social Science Research Council to complete a biography of General Duff Green, soldier, diplomatist, journalist, and industrial organizer of the Old South.

The following doctoral dissertation was accepted by the Department during the year:

Henry Thomas Shanks. The Secession Movement in Virginia. Part I—The Antecedents of Secession. (Under the direction of J. G. deR. Hamilton.)

In the first part of this study an attempt is made to trace and explain the growth of the secession sentiment in Virginia from 1847 to the election of Lincoln. The second part, which is in preparation, will continue the account to May 23, 1861, when the people of Virginia ratified the ordinance of secession.

As a background, a brief survey of the economic and social conditions which prevailed in Virginia in 1860 is made. Sectionalism within the state and the economic and social bonds which bound these respective sections to the North and South are examined.

This introductory sketch is followed by a review of Virginia's reaction to the national struggle which led to the Compromise of 1850. It is pointed out that although the articulate elements of the state were a unit against the Wilmot Proviso, few leaders supported the Nashville Convention. Once the Compromise of 1850 had become law most factions eagerly accepted it. Out of the controversy, however, came arguments and pamphlets which were later used in the campaign for secession.

Chapter III is a brief survey of the party history of the state and the reaction of the political leaders to the national struggles over slavery from 1851 to 1859. The succeeding chapter reviews the activities of the secession propagandists, including Edmund Ruffin, Willoughby Newton, and M. R. H. Garnett, during the same decade. The latter chapter also traces the growth of a Southern nationalistic sentiment. In this connection it is maintained that the consciousness of this nationalism was encouraged by attempting to create a Southern literature, by patronizing sectional colleges, by developing Southern economic independence, and by the growth of sectional churches. Although it is not contended that most Virginians accepted the idea of a Southern nation, it is demonstrated that there was sufficient consciousness of common interests with the South to determine the course that the state would take when the problem of choosing between a Northern and a Southern nation presented itself.

The last two chapters deal with the John Brown raid and the presidential election of 1860. In connection with the former, an attempt is made to estimate the influence of this event in increasing the secession sentiment in Virginia. After analyzing the reaction within the state it is concluded that although as a result of the raid the majority of the people did not favor disunion, a great many former conservatives were convinced that the advantages in the union were fast becoming less than the evils which would follow secession. In the presidential campaign in Virginia, as in the other Southern states, the supporters of Bell and Douglas insisted that Breckinridge was a secession candidate. This contention has been accepted by reputable historians. The vote in Virginia does not sustain this contention.

The following master's theses were accepted by the Department during the year:

GEORGE LEE DICKSON. The Early Career of John C. Calhoun. (Under the direction of H. M. WAGSTAFF.)

The purpose of this thesis is to relate as briefly as possible the chief incidents in the life of Calhoun from his birth to his acceptance of the secretaryship of war.

While no specific attempt has been made to show the successive steps by which Calhoun developed into a Nationalist, such changes as tend in that direction are noted as the narrative proceeds.

The first chapter deals with his parentage, his boyhood, and his education. Much space is devoted to one of his teachers, Moses Wadell, and his famous school at Willington, S. C., because the writer believes that it was this teacher and his associates at this school who so profoundly influenced the career of the future statesman. Brief mention is made of his career at Yale and at Litchfield as showing the Federalist influences surrounding him in the formative period of his life.

In the second chapter are related the incidents of his career in the South Carolina Legislature, his brief experience as a lawyer, his marriage, and his settling down at Fort Hill.

The third chapter deals with his attitude toward the War of 1812. His speeches on the war, on the Embargo and Non-importation acts, and on the establishment of a national banking system are analysed. Quotations from his speeches are given to illustrate his power as an orator and debater.

The evils of the currency situation, with an outline of Calhoun's speech supporting his plan for the creation of a banking system as a corrective for the prevailing evils are likewise discussed. The outlines of his speeches on such measures as the Tariff Act of 1816, internal improvements, the Bonus Bill, and the Compensation Act, as given in this thesis, show his distinctive ideas as to Nationalism.

The thesis concludes with his letter of acceptance to President Monroe of the secretaryship of war, together with a few comments as to his personal character and ability.

Jefferson Barnes Fordham. Political Ideas of James Iredell. (Under the direction of W. W. Pierson, Jr.)

An attempt is made in this thesis to outline the political and juristic ideas of Judge James Iredell with a view to determining his permanent classification in the development of American political thought. Particular attention is devoted to the views of Judge Iredell upon the federal constitution and the federal system.

It is customary to attribute to Judge Iredell's dissenting opinion in the case of *Chisholm* v. *Georgia* the leading statement of the state rights doctrine which flowered in nullification and secession. The writer has reached the conclusion that this disposition is misconceived. It is his position that Judge Iredell was neither a state rights man nor a Nationalist but simply a Federalist in the literal sense of the term. The whole proceeding in the case of *Chisholm* v. *Georgia* is treated somewhat in detail in order to estimate accurately what the judges did and said.

Thomas Horne Leath. The Know Nothing Party in North Carolina. (Under the direction of R. D. W. Connor.)

It has been the purpose of this study to present the history of the Know Nothing party in North Carolina. Newspapers of the period furnished the chief source of material.

This secret political organization with the sole principles of anti-Catholicism and anti-foreignism was founded in New York and soon spread over the East, reaching North Carolina in the fall of 1854. Its influence was first felt in the municipal elections. By 1855 it had virtually replaced the Whig party, and in that year elected three representatives to Congress.

The state convention met in Greensboro in 1856 and nominated John A. Gilmer for governor. He was defeated by Thomas Bragg, the Democratic in-

cumbent, but the party succeeded in placing fifty-seven men in the legislature. Millard Fillmore, the candidate for President, was overwhelmingly defeated as he received the vote of only one state, Maryland.

All hope of building a great union party was abandoned and the organization declined rapidly. Gilmer, of the fifth district, was the only Know Nothing elected in the Congressional campaign of 1858. The order was too weak to nominate a candidate for governor; so it merely threw its support to Duncan K. MacRae, the independent, in opposition to the Democratic nominee. The organization disappeared within the next year and its adherents returned to the Whig party.

CHARLES KATHARINE MADDRY. The North Carolina Constitution of 1776. (Under the direction of R. D. W. CONNOR.)

This paper is a study of the steps which led up to the formation of the North Carolina Constitution of 1776, the political ideas of the framers of that document, and an analysis of the Constitution itself.

As a background for the discussion, a brief account of the government of North Carolina as a colony is given. This discussion is followed by a brief account of the overthrow of the royal government and the establishment of the revolutionary government of 1775-1776. These movements, and especially the problem of independence, revealed a clear-cut division of the people into radicals and conservatives and resulted, after the Declaration of Independence, in a contest over the control of the Constitutional Convention of November, 1776. An analysis is then given of the ideas of different leaders of the time as to the kind of government that should be formed, and the essential facts as to organization, personnel, and division of opinion of the Convention, and the actual adoption of the Constitution. The Constitution itself is then analyzed and the various provisions for the government of the state and the authorship of certain of the more important clauses in the light of contemporary and of later evidence discussed. This is followed by a discussion of the nature of the government established as an expression of the ideas of the people.

MARVIN LUCIAN SKAGGS. The Condition of the Roman Senate from Tiberius Gracchus to Sulla. (Under the direction of W. E. CALDWELL.)

The aim of this thesis is, first, to relate the situations in which the Roman Senate found itself during the period from the tribunate of Tiberius Gracchus in 133 B.C., to the close of the Sullan regime, about 75 B.C.; and in the second place, to examine the character of the men who took part in the events of this period. It is based on the primary sources and the best of the secondary works. The revolutionary period of the Gracchi is treated, with its challenges of the traditional power of the aristocracy and the Senate's resulting degeneration into a street mob to exterminate its rivals. The second chapter relates the restoration of the oligarchy after the fall of Gaius Gracchus, and the attempt of the aristocracy to regain its former prestige. The Sullan regime,

with its monarchical character and its apparent reviving of senatorial supremacy, is treated in the third chapter, while the concluding chapter consists of an examination of the character and personalities of the leaders of the senatorial party. The body which to Polybius was an "assembly of kings" had degenerated at most into "an assembly of princes."

William Edward Uzzell. History of Tobacco in North Carolina Before the Civil War. (Under the direction of F. P. Graham.)

The object of this research is to give the history of tobacco in North Carolina before the Civil War from an economic and political view point. The history of tobacco along with the general economic history of North Carolina has been neglected. The object of this thesis is to add a chapter to the economic history of North Carolina.

The specific problem is to show that the present position of tobacco in this state was established largely on certain factors that were in operation before the Civil War. The study has been divided into five general topics: (1) historical background before introduction into North Carolina; (2) origin and development of tobacco culture in colonial history, with its advantages and disadvantages; (3) political and economic significance of its culture; (4) early methods of cultivation and marketing; and (5) the causes for the decline and rise of tobacco culture between 1800 and 1860.

The conclusions that have been reached from this study are: (1) the true importance and extent of tobacco culture during the colonial period was not recognized; (2) the basic factors that have made possible the great position of tobacco in this state today were in progress before the Civil War; (3) tobacco and the economic history of North Carolina have been neglected; and (4) the sources for study in this field are few and widely scattered.

SCHOOL OF LAW

M. T. Van Hecke has published:

Insurance Trusts—The Insurer as Trustee. *North Carolina Law Review,* VII: 21-36. December, 1928.

A study of the practices, statutes, and decisions involved in the efforts of several life insurance companies to enable the proceeds of deferred payment settlements to be exempt from the claims of the beneficiaries' creditors.

North Carolina and the Restatement of Contracts: Conditional Acceptances and Counter-offers. *North Carolina Law Review,* VII: 173-79. February, 1928.

A critical comparison of the decisions of the North Carolina courts relating to conditional acceptances and counter-offers, with the corresponding rules promulgated by the American Law Institute's Restatement of the Law of Contracts.

PROFESSOR VAN HECKE has been engaged this year in the preparation, in connection with a committee of the North Carolina Bar Association, of a study (to be published soon) of the exact relationship between the North Carolina Law and the Restatement of Contracts with Reference to Offer and Acceptance, Consideration, Seals, Joint Contracts, Third Party Beneficiaries, and Assignments.

ROBERT H. WETTACH has published during the year:

Recent Developments in Newspaper Libel, published simultaneously in 7 *N. C. Law Rev.* 3-21 and 13 *Minnesota Law Rev.* 21-39 (December, 1928).

DEPARTMENT OF MATHEMATICS

WILLIAM CAIN has published during the year discussions of the following papers:

Analysis of Arch Dams by the Trial Load Method, by C. A. Howell and A. C. Jaquith, *Proceedings of the American Society of Civil Engineers,* August, 1928, p. 2894.

Load Distribution in High Arch Dams, by R. A. Sutherland. *Proceedings of the American Society of Civil Engineers,* September, 1928, part I, p. 2151.

JOHN W. LASLEY, JR., is engaged in formulating analytically certain relations between the osculants and penosculants of plane curves. In a paper presented to the North Carolina Academy of Science at its meeting in May, 1929, a one-to-one correspondence was pointed out between two parametric representations of the pencil of penosculating cubics. This correspondence was expressed algebraically and used to determine an important coefficient in the canonical expansion of curves.

A. S. WINSOR has been engaged in the following investigations:

A Problem in Finite Differences.

A Solution by Means of Elliptic Functions of a Problem in Ambience.

ERNEST L. MACKIE has published The Jacobi Condition for a Problem of Mayer with Variable End Points. *Annals of Mathematics,* XXX: 3: 393-410.

The following master's theses were accepted by the Department during the year:

E. A. CAMERON. The Role of the Absolute in Geometry. (Under the direction of J. W. LASLEY.)

The effort to obtain general definitions of metric properties of plane geometrical configurations results in the introduction of an assumed fixed conic called the Absolute by Professor Arthur Cayley. Distance and angular measure are defined in terms of the elements involved and the Absolute. Thus, metric properties of figures are shown to be properties of the figures considered in relation to the Absolute conic.

The theory of the Absolute is developed as a natural outgrowth of some elementary projective considerations. Formulas for the distance between two points and the angle between two lines are derived in terms of the coördinates of the elements. The same unit is adopted for both measurements.

One chapter is devoted to a discussion of Cayley's approach to the theory, and his definitions and results are shown to be equivalent to those developed in the previous work.

The nature of the Absolute conic determines the type of metric geometry. It is specified that the Absolute is real, imaginary, and degenerate successively, and the general formulas are shown to reduce to the analytic formulas of hyperbolic, elliptic, and parabolic geometry, respectively.

The relation between projective geometry and the several types of metric geometry is demonstrated by means of the theory of the Absolute.

DAN HALL. A Criterion for Examining the Roots of an Algebraic Equation. (August, 1928.) (Under the direction of E. T. BROWNE.)

By the application of Vandermonde's determinant the discriminant of a general equation is computed in the form of a determinant. From this determinant alone we examine the roots of the equation. A sequence of determinants formed from the discriminant gives the number of real and distinct roots, the number of imaginary roots, the multiplicities of these distinct roots, and, also from this determinant, an equation is set up which contains the distinct roots only.

We then make an application of this general theory to the quartic equation, giving examples to illustrate each case.

MARSHALL WARD HOOK. Some Problems of Euclidean Geometry Treated Projectively. (August, 1928.) (Under the direction of J. W. LASLEY.)

In this paper a number of propositions of Euclidean geometry are proved projectively. A variety of Euclidean construction problems are constructed and proved by projective methods. All the quadrilaterals of Euclidean geometry are defined in terms of projective notions. It is our purpose not merely to give some new proofs and solutions of some old familiar problems,

but rather to show how one may get a broader and clearer outlook on Euclidean geometry by viewing it in the light of projective geometry.

CAROLYN RUTH ROGERS. The Tschirnhausen Transformations. (August, 1928.) (Under the direction of A. W. HOBBS.)

Transformations of the form

$$y = d_1 + d_2 x + d_3 x^2 + \ldots\ldots\ldots + d^n x^{n-1}$$

were first studied by Tschirnhaus in the seventeenth century and are known as the Tschirnhausen Transformations. Although they play an important role in the theory of equations, a detailed presentation of these transformations as applied to the cubic, reducing it to the binomial form, and as applied to the quartic, reducing it to the trinomial form, is not to be found in any texts on the theory of equations. It is the purpose of this paper to treat the subject in such detail that it may be followed throughout its intricate algebraic processes.

ELIZABETH STILL ROGERS. Desargues and His Contribution to Projective Geometry. (Under the direction of J. W. LASLEY.)

This thesis contains first, a biographical sketch of Girard Desargues (1593-1662), who was born at Lyons and spent his active days in Paris, where he was famous as a mathematician, an architect, an engineer, a humanitarian, and a stone cutter. This is followed by a discussion of his contribution to mathematics. This discussion is concerned chiefly with the field of projective geometry—involution, infinite elements, homology, and poles and polars being especially considered. The explanation of the loss of his work is treated fully in the third chapter. Following this, a chapter is devoted to the proofs of his more important theorems which include the projective property of an involution, the quadrilateral theorem, the quadrilateral inscribed in a conic, and the famous triangle theorem. The last chapter gives the various proofs of the last-mentioned theorem, a criticism of them, together with notes and comments which clear up obscure spots. A feature of the thesis is a contrast, shown by drawing, of the figures used by textbook writers and the figures which might be more advantageously used.

VALERIE MAYNARD SCHAIBLE. Parametric Representation of Curves. (August, 1928.) (Under the direction of J. W. LASLEY.)

In this paper a study is made of plane curves which can be expressed in terms of some parameter. Some of the more important unicursal curves were expressed parametrically and are listed in the paper. Projective homogeneous coördinates were used in most cases. An attempt was made to observe the general laws that exist which would tell one what curves can be expressed parametrically.

MIRIAM A. THOMPSON. The Icosahedron, Studied from the Viewpoint of Analytic Geometry. (August, 1928.) (Under the direction of J. W. LASLEY.)

This paper is an analytic study of the icosahedron and the sixty rotations of the figure into itself.

The geometry of the icosahedron is first worked out completely, using only elementary mathematics. The icosahedron is considered inscribed in a sphere of radius unity and from this the length of an edge and the magnitude of all important angles are determined. These angles are necessary for a study of the rotations.

Choosing a set of rectangular axes the coördinates of all vertices and other important points are determined; the equations of faces and edges tabulated.

Special rotations about rectangular axes are studied. These, however, give only 15 of the 60 possible rotations. Hence, a general linear fractional transformation corresponding to a rotation is made use of. This transformation, together with the values of the angles, obtained in the first part of the paper, give all 60 rotations of the icosahedron into itself. Typical examples of such transformations are worked out in detail, and tables are given listing the necessary data for the computation of the full set of 60 transformations corresponding to rotations of the icosahedron into itself.

DEPARTMENT OF MUSIC

Paul J. Weaver has made arrangements for male chorus of two old Basque Christmas carols, a Russian folk song, and a song from the Russian Liturgy, which are being published by the Oliver Ditson Company and the Willis Music Company. He has also under way male chorus arrangements of a series of twenty-five Negro folk songs, to be published by the C. C. Birchard Company. These songs are, for the most part, transcriptions from the singing of untrained negro groups.

DEPARTMENT OF PHARMACOLOGY

William DeB. MacNider has completed the following papers during the year:

Studies Concerning the Value of a Solution of Glucose in Maintaining the Acid-Base Equilibrium of the Blood in Pregnant Animals. Study II. The Effect of a Period of Chloroform Anaesthesia in Pregnant Animals.

The Lack of Protection Conferred by a Solution of Glucose. *Jour. Pharm. and Exp. Therapeutics,* XXXV: 31. 1929.

The Development of the Chronic Nephritis Induced in the Dog by Uranium Nitrate. A Functional and Pathological Study with Observations on the Formation of Urine by the Altered Kidneys. *Jour. Exp. Med.,* XLIX: 387. 1929.

The Functional and Pathological Response of the Kidney in Dogs Subjected to a Second Subcutaneous Injection of Uranium Nitrate. *Jour. Exp. Med.*, XLIX: 411. 1929.

PROFESSOR MACNIDER has the following problems under investigation:

The susceptibility to injury and the mechanism of repair of the uriniferous tubule in the dog kidney.

A consideration of the factor of the age of the animal in the processes of tubular repair.

The stability of the acid-base equilibrium of the blood in puppies as contrasted with adult and senile dogs.

The histology of the kidney in *Pretopterus ethiopicus.*

DEPARTMENT OF PHYSICS

OTTO STUHLMAN, JR. The Thermophosphorescent Radiations of Hiddenite and Kunzite. *Journal of the Optical Society of America,* XVIII. May, 1929.

Near 1050° C. hiddenite becomes luminescent. A band of low luminosity was found at .683 μ to .589 μ with a maximum at .650 μ. Just below the point of ignition a band was observed extending from .700 μ to .589 μ with a maximum at .647 μ and a faint green band with its maximum at .540 μ. No ultra-violet bands were observed.

Thermophosphorescence of kunzite begins at 168° C. Near 300° C. a yellow-green band was observed with a maximum near .520 μ, and an orange band with a maximum near .593μ. Up to 400° C. the band widened.

The radiations are subject to fatigue, and their spectral distribution is dependent on the chemical character of the traces of impurities present. The emissions are modified by previous heat treatment.

The Physical Characteristics of Kunzite and Hiddenite. Read before the Elisha Mitchell Scientific Society, December, 1928.

Summarizing the observations made to date.

OTTO STUHLMAN, JR., and M. W. TRAWICK. Mercury Spectrum by High Voltage Electrodeless Discharge. Read before the American Physical Society, December, 1928.

Electrodeless discharges through a capillary and the ring discharge in a 12 cm. spherical bulb were compared with the spectrum from a quartz mercury vapor lamp. Spectrograms of the ring and capillary discharge were made at 25° C. and 5 microns pressure; frequency of damped oscillations 1.5×10^8, capacity .0016 mf; sparking voltage 18×10^3; intensity controlled by spark

gap. The spectrum of the discharge through a capillary is identical with that of the luminous ring discharge in the bulb. Spark and arc lines are about equal in number. No continuous spectra are observed under above conditions. Forty lines observed between 4046 and 6564. Spectral region between 4358 and 4916 shows details of converging series not obtainable by high pressure mercury vapor arcs.

OTTO STUHLMAN, JR., and M. W. TRAWICK. Relative Intensities of the Mercury Lines $2^3P_{0,1,2} - 2^3S_1$ in the Electrodeless Discharge. Read before the North Carolina Academy of Science. May, 1929.

The electrodeless discharge was obtained in a spherical glass globe, 12 cm. in diameter at 20 microns pressure, using a damped high frequency oscillating circuit with pancake coil emitting a 200-meter wave. The spectrograms were obtained with a Gaertner spectrograph and analyzed with a Moll microphotometer. The intensities of the lines 5461, 4358, and 4047 as excited in this discharge were compared with similar wave lengths excited in the high pressure mercury vapor lamp.

COMPARATIVE INTENSITIES

	E—Electrodeless		*A—Arc.*	
Wave Lengths		Ratio of Intensities $\frac{E}{A}$	Fray and Montgomery	P
5461	E			
5461	A	1.0	1.0	1.0
4358	E	1.4	6.0	1.2
4358	A			
4047	E			
4047	A	1.2	1.8	.3

For comparison, the table includes results obtained by Fray and Montgomery at a pressure of the order of 1 micron and with a 3-meter wave length. Column P gives the ratio of the probabilities of the transitions as obtained by White from voltage—intensity relations, i.e., the number of quanta emitted for an accelerating voltage of 10.2 volts in mercury vapor at about 230° C.

OTTO STUHLMAN, JR., and HENRY ZURBURG. Height-Distribution of Bursting Bubbles Due to Effervescence. Read before the North Carolina Academy of Science, May, 1929.

Any gas dissolved in distilled water at a given pressure and temperature will effervesce when heated to a higher temperature. The bubbles pass through the surface and burst into fragments, dragging some of the liquid with them. The trajectories of the bursts were photographed and classified according to the heights of their ascensions. From gas kinetic considerations it can be theoretically shown that the height-distribution should follow a Maxwellian distribution law. Bubbles burst on the average either into two or more fragments; each group of fragments distributes itself according to an approximate Maxwellian curve.

PROFESSOR STUHLMAN has the following studies under way:

Energy-Distribution of Exploded Gas Bubbles after Transitions Through Oil-filmed Water Surfaces. (With HENRY ZURBURG.)

A Systematic Study of the Physical Properties of the Spodumenes. (With K. Z. MORGAN.)

The Electrodeless Spectra of Gases. (With M. L. BRAUN, progress on doctor's thesis.)

Intensity Relations in the Mercury Spectrum as influenced by Different Conditions of Excitation. (With M. D. WHITAKER, progress on master's thesis.)

E. K. PLYLER has completed the following research:

The Combination of Frequencies in the Infra-Red Bands of Calcite and Strontianite. *Physical Review,* June, 1929.

The infra-red absorption bands of calcite and strontianite have been observed and several bands not recorded by other observers have been detected. This makes it possible to arrange the infra-red bands in series for all the major bands observed between 1 and 20 μ.

The Infra-Red Absorption Bands of Organic Liquids. (In press.)

Over one hundred organic liquids have been studied and certain similarities in the infra-red bands of all organic liquids that have so far been measured have been noted. It is found that all organic materials which contain carbon and hydrogen have four fundamental bands. All the other bands which these materials have are either overtones or combination bands.

The following master's theses were accepted by the Department during the year:

THEODORE BURDINE. Infra-Red Absorption Bands in the Alcohols. (Under the direction of E. K. PLYLER.)

Many observers have studied the infra-red absorption bands of organic compounds and have found regions of intense absorption at 3.25 μ, 6.9 μ, 9.9 μ and 13 μ due to the C-H bond. These regions of absorption, because of their intensity and place in the spectrum, are assumed to be the fundamental frequencies of the substances studied. By taking combinations and overtones of these four fundamentals, the writer accounted for all the C-H bands of intensity that Sappenfield found in the alcohols from 0.8 μ to 2.5 μ. Other bands occur, one at 3 μ, which are thought to be due to the O-H bond because of their constant appearance in compounds that have the O-H radical. The writer has studied the alcohols from 2 to 8 μ and applied this system with a high degree of success. All the bands, calculated and observed, check within experimental error.

P. J. STEELE. The Infra-Red Absorption Spectra of Organic Nitrates. (Under the direction of E. K. PLYLER.)

The infra-red absorption of four organic nitrates has been studied in the region from 1.0 to 7.5 μ. The liquids used are methyl nitrate, ethyl nitrate, propyl nitrate, and butyl nitrate. Two absorption bands are attributed to the O-H linkage. All other bands are attributed to the carbon-hydrogen linkage. As an additional CH_2 group is introduced, two characteristics appear, namely, the intensity of all bands decreases and a shift of from .01 to .06 μ to longer wave length occurs. No characteristic absorption spectra of the NO_3 group has been found. Investigators have found that the carbon hydrogen linkage gives regions of intense absorption at 3.43, 6.86, 13.6 to 13.8 and 14 μ. Fundamental frequencies are obtained in these regions. The other bands are obtained by a combination of these fundamentals. The calculated bands check within experimental error with the observed bands. The general band spectra formula, $NV_1 = NV_0 (1 - nx)$, is used in the calculations of bands.

M. W. TRAWICK. An Analysis of the Electrodeless Spectrum of Mercury at 20 Microns Pressure. (Under the direction of OTTO STUHLMAN, JR.)

The intensities of the lines $2^3P_{0,1,2} - 2^3S_1$ in the mercury arc spectrum at atmospheric pressure were compared with intensities of the same lines in the mercury electrodeless discharge at 20 microns pressure and room temperature. It was found that the intensities of $2^3P_{0,2} - 2^3S_1$ in the electrodeless discharge were greater than those of the same lines in the arc spectrum if 5461 is taken as having the same intensity in both spectra. The Moll microphotometer was used to measure the density of the lines on the spectrograms from which the intensities were determined.

Variation of pressure seems to be the most convenient factor in the control of the electrodeless discharge in the type of set-up used. The observations of Robertson and Davis in regard to variations with pressure and spark gap potential were confirmed. The mercury hydride band 4520 was observed in the electrodeless discharge.

DEPARTMENT OF PHYSIOLOGY

FREDERICK P. BROOKS has completed the following investigations during the year:

The Protein Intake of Medical Students. *The American Journal of Physiology*, LXXXIX: 2: 403.

Eight hundred and seventeen twenty-four-hour urine specimens of one hundred and nineteen male medical students showed an average urinary nitrogen excretion of 10.34 g., equal to a protein consumption of 71.31 g. per 70 kgm. of body weight. This shows that the protein consumption in a climate

5.0-6.9 C. is about the same as for climates much colder and much warmer, as at Cleveland and Tulane. It also shows that medical students require only about two-thirds the amount of protein usually allowed by dietary standards.

FREDERICK P. BROOKS and D. A. MCPHERSON have published the following paper:

A Study on the Determination of Amino Acid Nitrogen in Bacteriological Culture Media. *The Journal of Laboratory and Clinical Medicine,* XIV: 9: 3.

See *Research in Progress,* 1927-1928, for abstract.

FREDERICK P. BROOKS, A. S. WHEELER, R. C. NORTON published the following paper:

Diketones. I. The Reaction between 4-Phenylsemicarbazide and Acetyl Acetone. *The Journal of the American Chemical Society,* L: 2488, 3390.

PROFESSOR BROOKS is continuing his study on the chemistry of cholesterol. With F. C. VILBRANDT he has undertaken a study of the vitamin content of shrimp oil.

DEPARTMENT OF PSYCHOLOGY

J. F. DASHIELL. An Experimental Study of Spatial Orientation. Presented before the North Carolina Academy of Science, May 10, 1929.

Experimental investigations extending over several years of orienting behavior of white rats in mazes were summarized and a recent concluding experiment described in detail. In the latter, modifications of the open-alley mazes previously used were systematically introduced in order further to check possible guiding cues from without and from within the maze itself. The capacity of the animals to maintain orientation toward the objective continued to be demonstrated under these additional controls. Interpretation of the behavior is offered in terms of an established motor set, compensatory tendencies, and allied and antagonistic reflexes. It is suggested that the weight of the accumulated evidence is against the traditional interpretation of maze learning in terms of chain reflexes exclusively.

Effect of Emotional Excitement on Rational Behavior. (With J. R. PATRICK.) Presented before the Elisha Mitchell Scientific Society, March 12, 1929.

Hamilton's "quadruple choice" method of determining the different levels of perseveration reaction tendencies shown by different animal species and

different ages of human, was applied to the question implied in the title of this paper. His method consisted essentially in presenting a subject with a situation not completely soluble but calling forth persistent attempts, and in noting and grading the character of these attempts, which were found to vary in adequacy from those (highest) of the adult humans, through those of young or defective humans, those of monkeys, and those of mature dogs, to those (lowest) of puppies and cats. In the present experiment college students were found to react ordinarily on the highest level; but when subjected to emotionally exciting stimuli (loud auto horn, cold shower, electric shocks) their behavior fell to the lowest level.

PROFESSOR DASHIELL has been devoting major time to research in animal learning of the type represented by the Study of Spatial Orientation. He has also concluded a brief experimental study of the influence of different social situations on individual achievement.

HARRY W. CRANE (with M. E. GOUDGE) is continuing the study of free association reactions.

At the present time there have been organized data on about 150,000 word reactions for 100 subjects. Both qualitative and quantitative analyses of these reactions are being made. Some of the reactions of this experimental group are being compared with results on the Kent Rosanoff Association Test and the Stanford Revision of the Binet Simon with special reference to the vocabulary.

HARRY W. CRANE (with EDWARD RONDTHALER, JR.) is making an experimental study of the ideas associated with type faces in advertising.

Already over 1,100 reactions have been obtained from nearly 900 subjects. The main purpose of the study has been to develop a technique that would meet the objections previously made to studies of this type that the experimental procedure used, because of the artificiality of the conditions, invalidated the results.

ENGLISH BAGBY has in progress:

An investigation of the effect of fatigue upon the efficiency of the performance of tasks requiring frequent shifting of "mental set."

A paper for presentation before the International Congress of Psychology entitled Assimilation, Repression, and Sublimation.

The following master's theses were accepted by the Department during the year:

ABRAM GUSTAVUS BAYROFF. Orientation and Posturing Behavior of the Albino Rat in the Multiple-U Maze. (Under the direction of J. F. DASHIELL.)

The problem under investigation is the relative influence upon maze behavior of general orientation as compared with that of posture. 'Orientation' is restricted in meaning to cardinal directionality. 'Posture' refers to the patterning of response to the maze pattern. Twenty-eight albino rats were used, nineteen in a left-turn maze and nine in an alternate-turn maze. Precautions were taken to exclude extra-maze orienting stimuli by rotating the maze 180° before each run and by excluding from the maze room all animals but the one in the maze. The experimenter maintained a constant position regardless of the direction of the maze.

After the animals were trained to these situations, test segments were added and the animals run through these. These segments consisted of two left-turn alleys, two right-turn alleys, one left alley and one right alley, one right alley and one left alley, four lateral alternate-turn alleys. These segments were added to the left-turn maze. To alternate-turn maze were added two alternate-turn alleys.

The experiment gave evidence for the generalization that posturing as defined here exists regardless of orientation. Where posturing is absent the explanation is to be sought in the complexity of the response pattern. There is evidence further for orientation as defined here depending upon the simplicity of the stimulus pattern. An incidental observation of some considerable substantiation points out that more errors are made at the beginning of the maze than at the end, the explanation being learning in the early part.

MARGARET WESLEY FITZGERALD. A Study of the Validity of the Norms and Standardization of the Wells-Martin 'Method of Memory Examination Adapted to Psychotic Cases.' (Under the direction of H. W. CRANE.)

The norms of the Wells-Martin test are based on results of the examination of only fifty subjects, all of whom were employees of the Worcester State Hospital; and the method of giving the test allowed for variations of a subjective character. The purpose of this research was the testing of a larger and more representative group of people and the working out of a more standardized method. One hundred and eighty-seven subjects of different ages, geographical locations, educational level, and occupations were tested according to a carefully worked out set of instructions. Definite groups were tested with different materials given in ways designed for comparison of methods, materials, and groups.

The results showed a higher norm for the larger and more representative group than shown by Wells; a gradation between groups, ranging from highest to lowest: college groups; citizens between ages 35 to 49 years; non-collegiate younger people; citizens between the ages of 50 to 80 years. Some of the material was found to be better suited for use of the test than others. Use of the definite instructions and materials is recommended in place of the Wells less standard method.

Ruth E. Hamill. Behavior of White Rats in Mazes of Constant Pattern and Varying Distances To Be Traversed. (Under the Direction of J. F. Dashiell.)

It is an axiom in psychology that among the factors operating to determine the behavior of an animal the past experience of the organism is one factor.

The purpose of the experiment reported in this paper is to describe the effect of a maze habit of the white rat upon the subsequent running of a second maze which is physically incommensurate with the first maze in only one respect yet has the same significance. In other words, observation is made of the influence of one habit upon the formation of a second habit when the situations involved are mazes in which the pattern is identical and the only variable is the distance to be traversed.

For the conditions maintained in this experiment, the data obtained confirm the observations of other investigators that previous training in a maze is efficacious in the subsequent learning of a second maze. However, it was not demonstrated that the facilitating effect was due to transfer of pattern, although the conditions were optimal for such transfer.

DEPARTMENT OF ROMANCE LANGUAGES

Sturgis E. Leavitt has published during the past year:

Divine Justice in the *Hazañas del Cid. Hispania,* XII: 141-146.

A note on the *Burlador de Sevilla. Romanic Review,* XX: 157-159.

Urban T. Holmes has published during the past year:

The Books of Claude Fauchet. (With M. L. Radoff.) *Publications of Modern Language Association,* XLIV: 229-242.

Claude Fauchet was the first modern of the Renaissance to be interested in Old French literature. He possessed, or had borrowed, several hundred volumes of medieval material. An attempt is made to list the titles of these books and MSS from Fauchet's own allusions.

A Reply to Max Foerster of Munich. *Language,* IV: 201-203.

Breton *coroll* is of Celtic, not Latin origin. *Choreolare* could not be a contributing item for Old French *carole.*

Old French *Camalot*. *Romanic Review*, XX: 231-236. July-September.

The Arthurian capital, *Camalot*, is a semi-learned derivation of *Camalodunum* (not *Camulodunum*), found in Pliny's *Natural History*.

Notes on Child Speech. *American Speech*, XIV: 390-394.

Attention is called to the use of common designators: a noun *(de)* and a verb *(he)* used for any object or action; also to the predominance of dentals. A complete vocabulary is listed of a child of two.

Cligès and Germany. Read before the Philological Club of the University of North Carolina.

PROFESSOR HOLMES has in progress:

An edition of the works of Du Bartas. (With J. C. LYONS and others.) This will be complete by the early summer of 1930.

The Idealistic Philology of Karl Vossler.

Frankish Influence on Old French Syntax.

N. B. ADAMS has published:

A Note on García Gutiérrez and Ossian. *Philological Quarterly*, VII: 402-404. 1928.

José Zorrilla, *Don Juan Tenorio*. Introduction, notes, and vocabulary by N. B Adams. Knopf, 1929.

A Little Known Spanish Adaptation of Dumas' *Don Juan de Marana*. Announced to appear shortly in the *Romanic Review*.

J. CORIDEN LYONS has completed during the year:

A Neglected Manuscript: Guillaume Colletet's Life of Maurice Scève. (Accepted for publication by *Modern Philology*).

Popular Literature in France in the First Thirty Years of the Sixteenth Century. A paper read before the Philological Club of the University of North Carolina.

Rabelais and the *Littérature de Colportage* of His Day. A paper read before the Renaissance Section of the Modern Language Association. December, 1928.

PROFESSOR LYONS has in preparation:

Etienne de la Boétie's *De La Servitude Volontaire* and the Antimonarchical Literature in France in the Sixteenth Century. A paper to be delivered before the next meeting of the Renaissance Section of the Modern Language Association.

An edition of the works of Du Bartas (in collaboration with U. T. HOLMES, G. C. TAYLOR, and others).

THOMAS JAMES WILSON III has published during the year:

The Will of La Calprenède Père. *Modern Language Notes,* February, 1929.

The text of an abstract made from the will of Pierre de Costes, Seigneur de La Calprenède, father of the seventeenth-century *précieux* novelist, with an introduction and notes. This abstract is found in the *Carrés d'Hozier* of the Bibliothèque Nationale. The original will has never been found.

He has had accepted for publication:

The Marriage Contract of La Calprenède. *Modern Philology.*

The complete text of the marriage contract of this novelist, which has never been published, and which reveals the falsity of certain assertions concerning the terms of his union.

He has read before the Philological Club of the University of North Carolina:

La Calprenède's Use of History in the Novel *Cassandre.*

PROFESSOR WILSON is preparing for publication:

A Suggested Source for the Plot of the *Princesse de Clèves.*

Historical Material in the Heroic-Gallant Novel of the Seventeenth Century.

The following doctoral dissertation was accepted by the Department during the year:

G. WARD FENLEY. The *Roman de la Rose* in the Middle French Period. (Under the direction of U. T. HOLMES.)

It was the late Professor Ernest Langlois who made possible this thesis by publishing a definitive edition of the *Roman de la Rose,* and by studying carefully the sources of the authors, Guillaume de Lorris and Jean de Meun. As early as 1891, he had expressed a desire to work upon the influence of the poem on the writings of the Middle French period. His death, however, which took place before the fifth and last volume of his edition had been finished, made this task impossible.

In approaching a subject rejected by many as too long, the author was confronted by a mass of contradictory statements compiled by hundreds of critics who, without any first-hand knowledge, were content to make general statements. The good and bad were alike considered in order to discover some points of common agreement. It was found that even the master of the subject, Professor Langlois, on occasion sought his critical material in such

unreliable sources as Jean Bouchet, Claude Fauchet, La Croix Du Maine, Antoine Du Verdier, and, much later, the interesting Abbé Goujet.

Discounting the greater part of present-day criticism on this score, an effort was made to approach the core of the question by treating the allusions to the poem made by those credulous writers of the fourteenth and fifteenth centuries. In the first place, the great number of unclassified allusions were compiled with special reference to lists of authors which should be read in their age. As a general rule, Guillaume de Lorris and Jean de Meun were considered as the greatest of their contemporaries by a majority of the fourteenth-century authors. On the other hand, with the exception of such determined enemies as Christine de Pisan, Jean Gerson, and Martin Lefranc, the entire fifteenth century ranked the two authors with the best of the ancients, Homer, Vergil, and Ovid. Even Ronsard, Du Bellay, and Antoine de Baïf termed them infinitely superior to all who had gone before Jean Le Maire de Belges.

Interesting results were obtained by comparing the many poems in which Jean de Meun was brought before the court of justice for having slandered women. The sentence of the judge, always sympathetic toward the gentler sex, was invariably a beheading, a hanging, or an exile.

As for the satire, of which the *Roman de la Rose* was the principal source, there were found certain fixed rules outlined by Jean de Meun which became veritable laws in the following period. By using these rules as a guide, the satire was traced into the two succeeding centuries and it was found that women were the most popular subjects. The priests came next and then followed a long list of subjects such as wild youth, misers, gluttons, and the famous ills of the day. In connection with the priests, Faus-Semblant, the master deceiver, was treated as a close relation, if not a literary forbear, of the famous fourteenth-century horse, Fauvel, and of the last Renart (who walked upright on two feet).

It was found that the most influential partisans of Jean de Meun in the quarrel of the *Roman de la Rose* were identical with the leaders of the French Pre-Renaissance, namely Jean de Montreuil, Guillaume and Gontier Col, and Alain Chartier. This breath of the larger Renaissance explained why Ronsard was to cherish this poem as one of his three favorite volumes.

The extraordinary learning of Jean de Meun, and his vulgarization of sciences exerted a marked influence from the first, but achieved their greatest popularity with the *rhétoriqueurs* just before the sixteenth-century Renaissance.

As for the most interesting use of allegory and pure court-of-love poetry, Guillaume de Lorris ranked high above Jean de Meun in the minds of their followers. The author feels he has proved that although Jean de Meun was the sensational provoker of quarrels, it was the easy-flowing, lyrical beauties of the poetry of Guillaume de Lorris which in reality seduced a majority of the imitators of the *Roman de la Rose*.

The following master's theses were accepted by the Department during the year:

Susie Persons Brown. The Use of History by Casimir Delavigne. (Under the direction of U. T. Holmes.)

A careful study of four of the plays, *Les Vêpres Siciliennes, Les Enfants d'Edouard, Louis XI,* and *La Fille du Cid* has been made and the following conclusions reached as to Delavigne's use of history, which is the main point under consideration in this thesis.

In *Les Vêpres Siciliennes* Delavigne follows the legend which relates how the Sicilians formed a conspiracy under the leadership of an ardent patriot, Jean de Procida, to overthrow the French government, which conspiracy was successfully carried out and resulted in a terrible massacre of all the French on the island in 1283. History claims there was no conspiracy, but that the massacre was a natural outcome of the terrible cruelties inflicted upon the Sicilians. Delavigne has followed the legend, which may have been considered history in his day.

In *Louis XI,* who ruled France from 1461-1483, the then prevalent idea of the king as most cruel is melodramatically portrayed. Delavigne here uses history for local color only and changes it at will to produce better dramatic effects. This is the most successful of any of his plays with a romantic tendency.

In *Les Enfants d'Edouard* is portrayed the period between the death of Edward IV and the seizure of the throne by Richard Duke of Gloucester, who became Richard III. The dramatic interest of the play centers around the seizure and murder of the two princes, sons of Edward IV, the elder of whom was due to be crowned as Edward V.

In *La Fille du Cid,* Delavigne represents the daughter of the Cid a lover first of the elder son of his best and most faithful friend, Alvar Fañes, then after his death, as the lover of the younger son who had been trained and intended for life in a convent. This play lacks real truth and dramatic truth. The Cid legend has been cheapened by the insipid love affair introduced. Above all, the epic character of the Cid, its chief charm, is nowhere in evidence.

John Erwin Carroll, Jr. A Study of *Les Amours de Henry Quatre, par Louise de Lorraine, Princesse de Comty.* An unpublished manuscript in the Library of the University of North Carolina. (Under the direction of U. T. Holmes.)

The purpose of this thesis is to present all available information concerning the origin, authorship, physical characteristics, and contents of the unpublished manuscript *Les Amours de Henry Quatre,* the authorship of which has been rather doubtfully attributed to Louise de Lorraine, Princesse de Conti. Since this doubt exists, a sketch of the life of the Princesse de Conti is given, together with several sidelights on her character and accomplishments, to show whether or not she possessed the essential qualifications for the authorship of such a work.

Since the work itself is an old and valuable document, its physical aspects are described in detail. A resumé of its contents is given and various opinions as to its authorship are noted.

All known printed versions are listed, and the two available editions (Cologne 1662 and Paris 1786) are carefully compared with the manuscript.

As a result of this study, it is concluded that neither of these printed versions is based on the manuscript under consideration; therefore this manuscript represents an independent version. It is certainly older than any of the printed editions.

JOHN AYMAN DOWNS. Francois Ponsard and the Decline of the Romantic Drama. (Under the direction of W. M. DEY.)

This thesis contains, by way of introduction, a brief summary of the romantic drama from 1827 to 1843. Then follows a discussion of the life and works of François Ponsard. Next, by analyzing the tragedies *Lucrèce, Agnès de Méranie,* and *Charlotte Corday,* and by pointing out the romantic elements contained in them, an attempt is made to determine the nature of the drama that brought about the reaction against romanticism. From the number of romantic characteristics which this analysis reveals, it is concluded that Ponsard's aim in writing was to find a *juste milieu* between the romantic and classic drama, and that he was not attempting to revive the classic drama of the seventeenth century.

An analysis of Ponsard's comedy *L'Honneur et l'Argent* shows that this play, serious in tone and moral in purpose, contains some of the elements of the later social drama of Augier and Dumas fils.

Finally, a discussion of the origin of the *Ecole du Bon Sens,* and of Ponsard's connection with this school, leads to the conclusion that although this school actually existed, Ponsard was never connected with it except through his works.

CHARLES EARL POOVEY. Some Aspects of the Dramatic Art of Moreto with Comparisons to Other Playwrights of the *Siglo de Oro.* (Under the direction of N. B. ADAMS.)

This study consists of an analysis of the dramatic art of Moreto manifest in his accessible comedies of intrigue and of character, with comparisons to certain aspects of the art of other playwrights of the *siglo de oro.*

It is found that, in addition to the usual type characters, Moreto has created some unusual girl characters. His *gracioso* is peculiar, particularly in superiority over other *graciosos* in polish, intelligence and wit, and in importance in plot development; whereas other peculiarities of habits, language, and philosophy are less distinct.

In general aspects of plot like exposition, themes of love and honor, frequent subordination of character to intrigue, and endings, Moreto's plots are not unlike those of the usual *comedia de capa y espada;* but Moreto seems

peculiar in often having his plots centered around and dependent upon a single scheme or a number of more or less artificial schemes, mistakes, and like devices; and in his frequent and successful introduction of extraneous comic scenes into the plot.

Music and songs are woven into the plays of Moreto probably more often and certainly with greater artistic skill than in any other plays of the *siglo de oro*. Striking costumes and dancing figure particularly in *El Desdén* and less importantly in other plays of Moreto.

Moreto is a facile versifier, especially with the *romance* and *redondilla*, but has little gift as a lyric poet. His diction is remarkably free from grandiose figures and gongoristic passages. The poetry of Moreto is thus markedly different from that of his contemporary Calderón.

Moreto's originality is due not to innovations but to his accentuation and improvement of current dramatic ideas and devices.

ROBERT WHITE LINKER. Du Bartas' *La Première Sepmaine* and Pliny's *Naturalis Historiae*. (Under the direction of U. T. HOLMES.)

The purpose of this thesis is to attempt a solution of the problem of sources for the information on natural history in *La Première Sepmaine*, to try to prove that this information is derived from the work of Pliny the Elder.

The first chapter contains a discussion of Simon Goulart, commentator of the poem of Du Bartas, and a summary of his commentary, showing that while Goulart is very scholarly and seems to know the bibliography on natural history, he indulges in a multiplicity of references which, though they explain Du Bartas' work, are not designed to give sources in every case. Among the 1,864 references he gives, 303 are to Pliny. The second chapter considers Pliny's popularity as evidenced by the number of manuscripts and editions (200 manuscripts and 127 editions previous to 1593), over 25 works listed based either entirely or in part on Pliny.

The third chapter takes up Du Bartas' connection with the Pléiade as an indication of his interest in antiquity and cites parallels between Du Bartas and Pliny which show that Du Bartas often follows Pliny both in treatment of subject and in language, and that Du Bartas and Pliny both cover the whole range of natural history.

The concluding chapter discusses and summarizes the material treated. The sections of Du Bartas dealing with natural history cover all phases of the subject, while most of the works cited by Goulart merely cover one or two phases, or else do not agree with Du Bartas. This makes it evident that Pliny must be selected as the only work which deals with the subject of natural history fully and at the same time agrees with Du Bartas.

An appendix gives a series of parallel passages from Du Bartas and the *Bible* which show that Du Bartas used, in his story of the first week, episodes from the first chapter of *Genesis* through most of the *New Testament*.

DEPARTMENT OF RURAL SOCIAL-ECONOMICS

E. C. BRANSON. County Government and County Affairs in North Carolina.

Economic-social-civic studies of seven counties since November 1, 1928 (Bertie, Northampton, Harnett, Hoke, Scotland, Mitchell, and Stokes), for the University of North Carolina Institute for Research in Social Science, for guidance in behalf of improved county government in the state and the country at large. Prior to July 1, 1928, fifty-eight field surveys of county government and county affairs had been completed, almost exactly two-thirds of the rural counties of North Carolina. These studies of administrative government in country counties furnished abundant material for the deliberations of the State Commission on County Government, resulting in the five state-wide county government laws of the 1927 legislature. In 1929-30, at least one typical rural county will be studied in South Carolina, Georgia, Tennessee, Mississippi, and Louisiana, for the purpose of showing the contrasts, good and bad, between county government in these states with the county government of North Carolina.

S. H. HOBBS, JR. North Carolina, Economic and Social.

This doctoral dissertation has been completed. It covers twenty-two chapters of approximately seven hundred pages. An analysis of the economic and social resources of the state, the development of these resources, the present status, and the immediate prospects. The text is accompanied by abundant tables, graphs, and maps, accumulated during fourteen years devoted to the economics and sociology of North Carolina.

The fifty issues of the *University News Letter* during the year have carried briefs of these and other similar studies of North Carolina.

PAUL W. WAGER, in addition to being the research assistant in the Department, is director of the North Carolina Club studies and editor of the North Carolina Club Year-Book.

The chapters of the 1928-29 year-book of the Club, *Country Life in North Carolina*, are as follows: North Carolina's Geographic Advances, by S. H. Hobbs, Jr.; The Quality of North Carolina Citizenship, by Judge Robert W. Winston; Transportation and Communication in North Carolina, by Gould M. Hambright; North Carolina's Landless Farmers, by Arthur Raper; North Carolina's Farm Homes, by Paul W. Wager; A Program of Farm Relief, by James G. Evans; Public Health in Rural North Carolina, by S. H. Hobbs, Jr.; Public Welfare in Rural North Carolina, by Roy M. Brown; The Country Newspaper as a Rural Social Agency, by Lilian Pearson Brinton; Rural Education in North Carolina, by Marion R. Alexander; Rural North Carolina at Play, by William D. Perry; Recreation in Rural Western North Carolina, by Loretta Carroll Bailey; The Problems of Rural Government, by Paul W. Wager.

During the year the following studies were directed by the Department:

Increase and Decrease of Farms, Farm Tenants, and Negro Farmers in North Carolina from 1910 to 1925; North Carolina's Industrial Development in 1927; North Carolina as a Livestock State in 1925. Janet Quinlan, North Carolina.

Regional Studies of Negro Populations in Georgia; Public Welfare in North Carolina. A. F. Raper, North Carolina.

An Economic and Social Survey of Kentucky. J. F. Smith, Kentucky.

New Hope Church Community (Orange County, N. C.)—A Study of the Original Settlers and their Descendants. F. W. Hoffer, Virginia.

Rural Schools with Social Vision and Programs. Arthur Raper, North Carolina.

Economics and Sociology as Required Subjects in the Certification of Public School Teachers. Hugh P. Brinton, Jr., Pennsylvania.

Town and Country Interdependences. Manning M. Pattillo, South Carolina.

Nucleating Centers of Rural Community Life. Gertrude Vaile, Colorado.

Rural Churches with Social Vision and Programs. Harriette Wood, Washington, D. C.

Illiteracy in North Carolina. Hugh P. Brinton, Jr., Pennsylvania.

Changing Social Outlook for the Rural Woman. Julia Davis, Georgia.

Research in the Management of Rural Homes. A study of a selected group of sixty-two rural homes. Ruth M. Lindquist, Minnesota.

The Rural Church. W. T. Mattox, North Carolina.

Negro Landownership in Greene and Macon Counties, Georgia. Arthur Raper, North Carolina.

A Study in Town and Country Relations in North Dakota. P. W. Shankweiler, Pennsylvania.

Public and Private Welfare in Wise County, Virginia. F. W. Hoffer, Virginia.

Two members of the Department, Assistant Professor Paul W. Wager and Research Assistant Clifton J. Bradley, were loaned to the State Tax Commission for the fall quarter. Mr. Bradley assisted with the statistical work of the commission and Mr. Wager, with Mr. Bradley's assistance, wrote the section of the report dealing with Tax Administration and Tax Delinquency.

DEPARTMENT OF SOCIOLOGY

Howard W. Odum has edited for the American Social Science Series during the year the following:

A Social Interpretation of Education. By Joseph K. Hart.

Essentials of Civilization. By Thomas Jesse Jones.

Principles of Rural-Urban Sociology. By Pitirim Sorokin and Carle C. Zimmerman.

PROFESSOR ODUM has published during the year the following:

(With KATHERINE JOCHER.) An Introduction to Social Research. Holt and Company.

Contains the most exhaustive bibliography of sources in the field yet presented and analyzes from these sources the approaches, methods, and procedures in technical social research.

The "Scientific Human" in Social Research. *Social Forces,* March, 1929.

PROFESSOR ODUM is working on the following:

Southern portraiture: regional research into social resources and social waste of the South.

The third volume of the trilogy of case portraitures of an American Negro migrant.

With KATHARINE JOCHER he is undertaking certain tasks of analysis and synthesis of folk sociology.

ERNEST R. GROVES has published:

History of the Family for 1928. *American Journal of Sociology,* May, 1929.

Adolescent Strain and Social Pressure. *Social Forces,* March, 1929.

The Personality Results of the Employment of Women Outside the Home, and its Social Consequence. *Annals of the American Academy of Political and Social Science,* May, 1929.

PROFESSOR GROVES has edited for the Longmans Social Science series:

Man and Social Achievement. By D. C. Babcock.
Rural Sociology. By A. W. Hayes.
Poverty. By R. W. Kelso.
Race and Population Problems. By H. G. Duncan.
Social Research: A Study in the Methods of Gathering Data. By John A. Lundberg.

PROFESSOR GROVES has under way the following research:

Successful Marriage, a Study of the Problems and Methods of Family Adjustment.

Mental Hygiene in Colleges (with PHYLLIS BLANCHARD).

He is directing an investigation into the effects of isolation on the family and family relationships being made by LEE M. BROOKS.

HAROLD D. MEYER has published during the year the following:

Financing Extra-Curricular Activities. (With S. M. EDDLEMAN.) A. S. Barnes and Company.

He is continuing the study of the social significance of leisure time, acting with committee study groups from the American Country Life Association, Southern Physical Education Association, and the Playground and Recreation Association of America.

He is also directing research for the Physical Education Section of the North Carolina Education Association.

L. L. BERNARD has published:

Communography, Communometry, Communology. *Social Forces,* VII: 153-56. Sept., 1928.

The Negro in Relation to Other Races in Latin America. (With J. S. BERNARD.) *Annals of Amer. Academy of Polit. and Social Sciences,* Nov., 1928.

Some Historical and Recent Trends of Sociology in the United States. *Southwestern Political and Social Science Quarterly,* Dec., 1928.

La Situacion Politica en los Estados Unidos. *Nosotros* (Buenos Ayres), Año XXIII, Mayo, 1929.

Introduction to Papers on Human Ecology and Population. *Pub. of Amer. Sociol. Society.* 1928 (Vol. XXIII, published 1929).

PROFESSOR BERNARD has under way the following research:

The collection of sociological life histories of the founders of sociology in this country to be published, together with some twelve or fifteen introductory and explanatory chapters, under the title of An Autobiographical History of Sociology in the United States.

A History of Sociology in the Colleges and Universities of the United States, a companion volume to the autobiographical history of sociology.

For the *Encyclopaedia of the Social Sciences,* he has prepared an historical account of the social sciences in the United States; also a similar article on the social sciences in Latin America. The account of the social sciences in the United States will be extended to a volume.

Four brief articles for the *Encyclopaedia of the Social Sciences.*

Research into the development of social theory in American theological literature. (With J. S. BERNARD.)

WILEY B. SANDERS is completing his manuscript on the History and the Administration of the State Penitentiaries of Illinois. He is also working in coöperation with the State Board of Charities and Public Welfare of North Carolina as director of a survey of Negro child welfare in the state, and he is making with the same agency a study of the operation of the juvenile court system in North Carolina during the ten-year period, 1919-1929.

The following doctoral dissertations were accepted by the Department during the year:

HARRINGTON COOPER BREARLEY. A Study of Homicides in South Carolina, 1920-1926. (Under the direction of H. W. ODUM.)

The purpose with which this study was undertaken was to learn definitely the extent of homicide in the individual counties of South Carolina and the relationship of homicide to such factors as the climate and the presence of the Negro. The primary data for this investigation were secured from an examination of approximately 155,000 death certificates in the files of the South Carolina Bureau of Vital Statistics, an analysis of 1,902 homicide cases from the dockets of the county clerks of court, and the abstracting of the accounts of homicides contained in the Columbia, S. C., *State* for a three-year period.

Of the 1,601 homicides forming the basis for the major part of this investigation, a greater number occurred in December than in any other month of the year, Christmas day alone having more than five times as many as the average day. This is contrary to the conclusion commonly accepted by criminologists that crimes against the person decrease during cold weather.

The computation of homicide rates for the counties and cities resulted in the discovery of very marked differences with a range of from less than 3 to more than 80 deaths from this cause each year for 100,000 population. The cities of Florence and Anderson were found to have homicide rates of 82.8 and 79.5, respectively, per 100,000 inhabitants. These are among the highest death rates from this cause that have ever been reported. The counties containing cities and those in the southwestern section had far worse records than did the remainder of the state. The homicide rate for negro deaths was more than twice as high as that for whites. The city rate was also twice the rural

one. Over eighty per cent of the slayings were committed with firearms, doubtless because of the custom of carrying revolvers.

Of the 1,902 persons put on trial for murder and manslaughter only 51.5 per cent were convicted, but of 18,097 persons prosecuted for offenses other than homicide 77.3 per cent were convicted. Negroes who were brought into court charged with some type of homicide were twice as often convicted as were the whites, 64.1 per cent of the negroes being found guilty and only 31.7 per cent of the whites.

The 401 accounts of homicide indicated that sex and family conflicts were most frequently responsible for the beginning of the difficulties that led to the slayings, and that drunkenness and the enforcement of the prohibition law came second. Whites killed 57 negroes, including 30 slayings by officers of the law, while negroes killed 32 whites.

The coefficient of correlation between homicide rate for each county and the percentage of negro population was only $+.257$ with a probable error of $-.093$. The coefficients were even smaller between homicide rates and the county data for density of population, illiteracy, farm tenancy, value of manufactured goods per capita, or percentage of convictions in the trials for murder and manslaughter.

Roy M. Brown. Public Poor Relief in North Carolina. (Under the direction of H. W. Odum.)

This study attempts an analysis of the administration of public poor relief in North Carolina from colonial days until the present, from the points of view both of the legal provision for such relief and of its actual administration. The first chapter traces briefly the development of the English Poor Law as a background for the study. Poor relief legislation and practices in the colonial period are treated in relation to the social conditions of the time. The slow development of public interest in the care of the poor in almshouses, as reflected by half a century of legislative activity before the poorhouse became an established county institution, the administration of these institutions and of outdoor relief by the wardens of the poor constitute the story of the second period of this phase of the history of the state, extending over almost a century from the Revolution to the close of the Civil War. The advance toward scientific methods in the administration of the poor funds contemplated by the constitution of 1868 was not soon to be realized, and actual practices under the direction of boards of county commissioners (1868-1919) never excelled, if indeed they ever equaled, the standards set up by the wardens of the poor at their best.

With the creation of the new State Board of Charities and Public Welfare in 1917 and of mandatory county units of public welfare in 1919, there began a new era of greatly improved county home buildings and of gradual improvement in the administration of these institutions. From this time dated also the beginning of the application of careful social investigation both to the admission of inmates to county homes for the aged and infirm and to the grant-

ing of outdoor relief. The care of dependent children is traced from the old apprenticeship system, through the development of orphanages and the organization of a child-placing society, to the inauguration of a state system of mothers' aid. Finally, for the problems of the institutional care of the adult poor, two possible solutions are discussed—district almshouses, in the establishment of which Virginia is leading the way, and the county hospital with a ward for the infirm poor, following the successful experiment in Vance County, North Carolina.

KATHARINE JOCHER. Studies of Methods in Social Research. (Under the direction of H. W. ODUM.)

The recent development of the social sciences constitutes a distinctive feature of the present era which is itself dominated by the concept and practice of science. In this development the social sciences have achieved a far-reaching and significant advance through a closer interdependence and interrelationship among themselves and between the physical sciences and the social sciences. The physical sciences have stimulated the development of the social sciences through their historical development and personalities; by presenting situations for the social sciences to attack; by contributions in method, basic content, and materials; and by their alignment with the social sciences in attempting to work out social research problems.

This emergence of the social sciences and their interrelations with the physical sciences bring new tasks of great difficulty and significance. The chief of these is the development of social research in some such effective proportions as have been achieved by the physical sciences. Such research, however, must be essentially different in many ways from physical research, although maintaining the rigorous scientific standards and profiting much from the methodology of the physical sciences. The two chief problems appear to be (1) the problems of synthesis, unity, and interrelation between the physical sciences and the social sciences and between the various social sciences and "methods"; and (2) the problem of inaugurating and developing the scientific method in research into human affairs.

In the present study we assume a background of the historical development of the social sciences from definite norms of philosophical and analogical study to their present trends toward real scientific research and sound social theory, from which to proceed toward our inquiry into scientific methods of social research. This inquiry is limited to the special presentation and analysis of five types of methods in social research which now give promise of making large contributions to the scientific method in the social sciences. It is the thesis of the present study that the development and perfecting of the *historical*, the *case*, the *survey*, the *experimental*, and the *statistical* methods constitute the most significant contribution to the present movement toward more scientific methodology for the social sciences. And further, that there is great need for a clear presentation and general analysis of these methods and their prospects in order that they may be more fully utilized and in order that they may be developed still further and made more scientific.

As an aid to these methods, the specialists in social research will need to utilize all the details and techniques of approach and mechanical assistance possible in order to discover all possible avenues of developing new procedures and techniques. The present study, therefore, includes samplings from types of technical procedure which will aid the research student in familiarizing himself with the available sources, with the preparation and use of bibliographies, schedules, questionnaires, mechanical aids and equipment, and in the analysis, interpretation, and presentation of his results. Knowledge of such procedure is not only requisite in the development and application of the various methods, but should also tend to stimulate inventiveness toward new methods and procedures. All types of methods and procedures are subject to the test of their application to research into major problems of society.

The following master's theses were accepted by the Department during the year:

SAMUEL MCKEE EDDLEMAN. Financing Extra-Curricular Activities. (August, 1928.) (Under the direction of H. D. MEYER.)

The purpose of this study has been (1) to discover the methods used by outstanding schools throughout the country in raising, distributing, and accounting for extra-curricular finances; and (2) to work out methods and systems which, with very little adaptation, may be used by any school regardless of size, location, or the amount of money handled.

Information was secured from original sources by corresponding with the administrators of schools in every state in the nation. These schools were chosen from a list prepared by the United States Bureau of Education. This information was supplemented by materials gathered from numerous periodicals and books on extra-curricular finances.

The data gathered have been analyzed and discussed with reference to: methods of raising funds, their equitable distribution, and accounting for moneys. Existing methods and systems have sometimes been synthesized into new and possibly more practical and useful ones. Original plans have been included as a possible source of help in solving financial problems.

HELENA E. HERMANCE. Economic and Educational Development in the South, 1900-1925: A Comparison. (Under the direction of H. W. ODUM.)

The economic changes in the American South from 1900 to 1925 have been pointed out as nothing short of remarkable. The question to which this study addresses itself is: Have educational changes in the South been commensurate with economic advances? The analysis is statistical and the method used is the Pearsonian Coefficient of Correlation. For the eleven southern states under review the following have been selected as indices of economic advance: (1) growth of population, (2) growth of wealth, (3) growth of agriculture, (4) growth of manufacturing. It is proposed to measure educational

advances statistically by the use of two indices: (1) changes in number enrolled in public schools and (2) changes in expenditures for public schools.

For each of these items in each state and in the South are computed the gross advances, the actual increase per capita, and the percentage increase per capita. The following correlations are found between

1. Percentage of increase per 1,000 population in school enrollment and
   a. Percentage of increase per capita in value of agricultural products + .134
   b. Percentage of increase per capita in value of manufactured products ..... + .239
   c. Percentage of increase per capita in wealth..... + .398
2. Percentage of increase per capita in expenditures for public schools and
   a. Percentage of increase per capita in value of agricultural products + .361
   b. Percentage of increase per capita in value of manufactured products ..... + .435
   c. Percentage of increase per capita in wealth..... + .620

There is shown less relation between agricultural and educational advances. The increased school enrollment does not keep pace with economic advances as nearly as increased school expenditures. The highest relation is shown between percentage of increase per capita in wealth and expenditures for education. The graphs and tables throughout the study indicate a fair degree of commensurate advance in economic and educational development in the South from 1900 to 1925.

JANET QUINLAN. A Study of Rural Illegitimacy in Orange County, North Carolina, 1923-1927. (Under the direction of W. B. SANDERS.)

In all the material dealing with illegitimacy no study concerned primarily with rural illegitimacy is found. Accordingly, this is the first study of illegitimacy in a typically rural section. An attempt was made herein to study the rural unmarried mother and her child, and to discover in what respects rural and urban illegitimacy differ.

The causes and results of rural illegitimacy, both among whites and Negroes, were studied, the manner in which the mother and child were affected, what assistance was received from the father of the child, and what happened to the child. The information was gathered by means of a personal visit and a questionnaire.

The entire number of unmarried mothers, as recorded by the birth registration in Orange County, during the five-year period 1923-1927, and yet living in the county were seen. Of the 114 births recorded, only 51 unmarried mothers, 11 white and 40 Negro, were still living in the county. The percentages of illegitimacy, 1923-1927, was 3.9—for the whites 1.3, and for the Negroes 8.3.

The results can be summarized as follows: 45 per cent of the unmarried mothers were between 15 and 19 years of age; 49 per cent came from home-owning families; 16 per cent had never gone to school, and only one had gone beyond the tenth grade; 28 per cent had never joined the church; 29 per cent attended regularly; 82 per cent of the mothers kept their child; 41 per cent had more than one illegitimate child; only 42 per cent of the unmarried mothers received any aid from the father of the child; and 31 per cent had married at the time this survey was made.

This study also indicates that illegitimacy is greater among Negroes than among whites; that the ages of the white unmarried mothers are lower than the Negroes; that many of the mothers marry in time, but not to the father of the child; that, though the girl may lose her place in the community, such as her church membership (this is the case with Negroes) for a time, she is re-admitted again into full community standing and neither the girl nor her family considers her life ruined. The rural unmarried mother, in spite of the paucity of social agencies, leads a more normal life than the urban unmarried mother.

Since it was shown that all the unmarried mothers are not aided by the present illegitimacy law, the most essential points in a new law dealing with this situation are discussed.

DEPARTMENT OF ZOOLOGY

H. V. WILSON and J. T. PENNEY have published Cell Behavior in the Regeneration of Sponges from Dissociated Cells. *Journal of the Elisha Mitchell Scientific Society,* XLIV: 79. September, 1928.

H. V. WILSON read a paper, Some Guiding Ideas in Biology, before the Elisha Mitchell Scientific Society, Oct. 9, 1928.

For abstract see pp. 103-04.

R. E. COKER has in press two reports:

The Keokuk Dam in Relation to Fisheries of the Mississippi.

Studies of Common Fishes of the Mississippi River at Keokuk.

C. D. BEERS has published the following:

The Relation of Dietary Insufficiency to Vitality in the Ciliate *Didinium nasutum. Journal of Experimental Zoology,* LI: 121-133.

This paper is a presentation *in extenso* of the results published in preliminary form in the *Proceedings of the National Academy of Sciences,* XIV, 1928, and summarized in *Research in Progress* for 1928.

Rhythms in Infusoria, with Special Reference to *Didinium nasutum. Journal of Experimental Zoology,* LI: 485-493.

A pure line of *Didinium nasutum* was cultured under practically constant conditions for 265 days, with the production of 955 generations. The fission rate was practically constant throughout the period, and no evidence of inherent fluctuations in the reproductive rate (rhythms) was adduced. Daily examination of the animals failed to disclose endomictic changes. The transfer of certain individuals of the main culture to a diet of starved paramecia produced a marked decrease in the fission rate. Resumption of the original diet of well-fed paramecia restored the fission rate to its former level. The experimental production of fluctuations in the fission rate by changes in the quality of the food suggests that rhythms in other ciliates may yet be found to result from slight environmental changes or from cultural inadequacies.

On the Possibility of Indefinite Reproduction in the Ciliate *Didinium* without Conjugation or Endomixis. *American Naturalist,* LXIII: 125-129.

A pure line of *Didinium nasutum* was cultured under adequate and favorable conditions for 1,384 generations in the absence of both conjugation and endomixis. When the experiment was discontinued, the animals were fully as vigorous with reference to fission rate, death rate, and encystment rate as at the beginning of culture; they were entirely normal as regards structural details. The evidence indicates that neither conjugation nor endomixis is necessary for the maintenance of vitality in *Didinium,* and that *Didinium* is capable of indefinite reproduction without recourse to either of these processes, provided adequate cultural conditions are at hand.

PROFESSOR BEERS has continued his studies on the relation of diet to length of life and degeneration in the protozoan *Didinium nasutum,* with special reference to the recovery of vitality following subjection to extended inanition.

J. T. PENNEY read a paper, for himself and H. V. WILSON, The Regeneration of the Epidermis in Sponges Grown from Dissociated Cells, before the North Carolina Academy of Science, May 11, 1929, and before the Elisha Mitchell Scientific Society, May 14, 1929.

Abstract appears on p. 106.

L. L. HILL, research associate with PROFESSOR COKER, continued during the summer his studies of mating habits of cyclopid copepods, and his report is nearly ready for publication.

The following doctoral dissertation was accepted by the Department during the year:

JAMES T. PENNEY. Cell Behavior in the Regeneration of Sponges from Dissociated Cells. (Under the direction of H. V. WILSON.)

In the regeneration of sponges from dissociated cells do the dissociated elements become dedifferentiated to a totipotent embryonic state and subsequently become redifferentiated? Or do the various kinds of cells present in the expressed tissue maintain their characteristics and undergo a simple sorting out in the reunition masses to assume again their normal functions? Or do the so-called totipotent cells of the mesenchyme play the important part in regeneration?

The dermal and canalar epithelia of the adult sponge, *Microciona prolifera*, are continuous sheets of protoplasm, with irregularly scattered nuclei, in which no cell outlines are seen. In the epidermis a coarse reticulum of sharp lines marks out polygonal areas of surprising regularity. These lines probably represent condensations of the finely granular reticulum which is present in these sheets. The mesenchyme is made up of eight different kinds of cells which are recognizable by their nuclei and inclusions. The spongoblasts form a layer of flattened cells around the growing fibers. The spicules arise as intra-cellular secretions. Egg cells, sperm masses, gemmule-like masses, and larvae were observed in specimens fixed in late August and early September. The choanocytes are small spheroidal or polyhedral cells, the main body of which is about 4 μ in diameter. Flagella but no collars were observed.

The dissociated tissue is made up of five of the eight types of mesenchyme cells and the choanocytes. Two types of these mesenchyme cells, however, and the choanocytes make up the bulk of the dissociated tissue and of the early reunition masses. The cells in these reunition masses are intimately connected to form a syncytium. The various types of cells making up this syncytium, however, are recognizable by their nuclei and inclusions. The epidermis, which is fully formed before the masses become attached, is developed from a certain type of mesenchyme cells.

After the masses become attached they, due to the amoeboid movement of the cells within, flatten out over the substratum. When this flattening out starts further development takes place. The canals appear as spaces in the tissue and the lining epithelium is formed by the same type of mesenchyme cells that formed the epidermis. The mesenchyme cells are formed in part from cells that were carried over from the adult, but the greater part are developed from one type of mesenchyme cells. The flagellated chambers are developed from the choanocytes that were carried over from the adult sponge.

There is, then, no dedifferentiation of the dissociated elements to a totipotent state. Some of the specialized elements, such as the choanocytes, are carried over from the adult to take up their normal functions again. The process of regeneration as exhibited here, however, is not far different from the process as illustrated in sponges in general, in that the mesenchyme cells play a very important role.

INSTITUTE FOR RESEARCH IN SOCIAL SCIENCE

The increasing emphasis placed upon the social sciences within recent years and the need for scientific research in this field have

given rise to a number of organizations for promoting research, such as the Social Science Research Council and several of the national foundations which have set aside major portions of their funds for this purpose. In history, government, economics, sociology, jurisprudence, anthropology, statistics, social psychology, and other related fields there is need for new standards of research, for coördination, and for correlation.

At the University of North Carolina there had been for some time special need for assistance if the many investigations in the social sciences, already under way or projected, were to be carried out.

It was a fortunate circumstance, therefore, when the Laura Spelman Rockefeller Memorial and the Rockefeller Foundation made substantial grants to the University of North Carolina, for the study of problems in the social sciences arising out of state and regional conditions. For the administration and expenditure of these funds the President of the University has set up an Institute for Research in Social Science, the main purpose of which is to assist faculty members in the prosecution of their research by means of research assistants, field expenses, and clerical help. Research professors and associates, who by training and experience are well qualified to direct research in the particular fields to which they have been assigned, and research assistants with graduate training are now the chief agents for carrying on the work of the Institute.

The work of the Institute represents a specific program of regional social research, study, and interpretation. In both content and method it has undertaken and will continue to undertake to cover a wide range of study and interpretation of regional problems and culture patterns, as well as to present its problem-study results and occasional volumes in method, principles, and social practice, in so far as they are related to the promotion of the social sciences. The selection and prosecution of regional studies in general are made the joint basis of the availability and timeliness of the particular problem and its original contribution to the larger field of the social sciences.

The Institute, in coöperation with the University of North Carolina Press, has published to date:

Welfare Work in Mill Villages: The Story of Extra-Mill Activities in North Carolina. By Harriet L. Herring.

Public Poor Relief in North Carolina. By Roy M. Brown.

County Government in North Carolina. By Paul W. Wager.

Human Factors in Cotton Culture: A Study in the Social Geography of the American South. By Rupert B. Vance.

John Henry: Tracking Down a Negro Legend. By Guy B. Johnson.

The North Carolina Chain Gang. By Jesse F. Steiner and Roy M. Brown.

A State Movement in Railroad Development. By Cecil K. Brown.

Social Work and the Training of Social Workers. By Sydnor H. Walker.

Phonophotography in Folk Music. By Milton Metfessel.

William Gregg: Pioneer in Southern Textile Development. By Broadus Mitchell.

Folk Beliefs of the Southern Negro. By N. N. Puckett.

The Negro and His Songs. By Howard W. Odum and Guy B. Johnson.

Negro Workaday Songs. By Howard W. Odum and Guy B. Johnson.

Children's Interests in Reading. By A. M. Jordan.

Southern Pioneers. Edited by Howard W. Odum.

State Systems of Public Welfare. By Howard W. Odum and D. W. Willard.

The following MSS are in press or ready for publication:

The Community and the Mill. By Jennings J. Rhyne.

Labor Unions in the South. By George S. Mitchell.

Saint Helena Society. By T. J. Woofter, Jr. and others.

The Negro Sings a New Heaven and a New Earth. By Mary A. Grissom.

Constitutional Development in the South Atlantic States, 1776-1860. By Fletcher M. Green.

A Social History of North Carolina, 1800-1860. By Guion Griffis Johnson.

Thomas J. Woofter, Jr. (with Guy B. Johnson, Guion Griffis Johnson, Clarence Heer, Roy M. Brown) has completed the field investigations of Negro culture and development on Saint Helena Island, South Carolina, and is preparing the MS for publication. This study has been made possible by a special grant, but is under the auspices of the Institute.

Professor Woofter has also directed the following research:

In association with Clifton J. Bradley, the continuation of the study of the Tri-State Tobacco Growers' Coöperative Marketing Association.

In association with Arthur F. Raper, a study of rural organization in Greene and Macon counties, Georgia.

An investigation of the income and expenditures of students in the University of North Carolina.

Roy M. Brown has published during the year:

Public Poor Relief in North Carolina. The University of North Carolina Press.

DR. BROWN has the following research under way:

A Statistical Study of Crime in North Carolina.

This study is based upon data from the reports of superior court clerks to the attorney-general. It covers all indictments in the superior courts, involving 65,000 cases, for a period of four years, July 1, 1922, to June 30, 1926. The study will show type of crime and disposition of case by county, judicial district, judge, age, race, sex, and occupation. The chief value of the study is that it will form the basis for further valuable studies.

The collection of material for a documentary history of public welfare in North Carolina, which will be valuable as a reference book and also for teaching purposes.

He has directed the following research:

In association with HUGH P. BRINTON, an ecological study of Negro crime including a statistical treatment of criminals, juvenile delinquency and its relation to adult crime, topographical features and their relation to adult crime, social conditions in relation to crime, education, housing, health, group participation. The study was begun in Durham and will be extended to other cities in North Carolina.

With J. PAUL MCCONNELL, a study of the men released from the state prison of North Carolina, during the years 1917 to 1922 inclusive. All data available from prison records have been secured. Detailed case studies, of as many men as possible, will be made.

CLARENCE HEER has completed his study of the tax problem on Saint Helena Island, South Carolina—a statistical study of the burdensomeness of taxation in Saint Helena Township, Beaufort, South Carolina, in relation to the value of the various governmental services which the taxpayers receive in return.

He contributed the section on the taxation of public service corporations in the *Report of the Tax Commission.* Raleigh, North Carolina, 1928.

PROFESSOR HEER has under way a study of state and local finance: a problem in fiscal coördination.

This is an approach to the problem of securing inter-regional equality in the matter of tax burdens and uniformity in standards of local governmental services through a rational allocation of functions, financial burdens, and revenue resources as between the state and its subordinate political units. The statistical illustrations will be based mainly on the experience of North Carolina.

He has directed the following research:

In association with Hershal L. Macon, a history of taxation in North Carolina from 1777 to 1825. The study is to be continued and extended to 1920.

Harriet L. Herring has published during the year:

Welfare Work in Mill Villages: The Story of Extra-Mill Activities in North Carolina. The University of North Carolina Press.

Working Mothers and Their Children. *The Family*, November, 1928.

Cycles of Cotton Mill Criticism. *South Atlantic Quarterly*, April, 1929.

Miss Herring has continued her History of the Textile Industry in the South and will have the MS ready for publication during the coming year.

This study will cover the development of textile manufacturing from the domestic stage in the colonial and early national periods; the rise of the mills, expansion and diversification, concentration and localization, and the transplanting of the industry; some attention to technical development and to financial, manufacturing, and marketing organization; and with at least passing reference to group interests of owners and workers, to the social implications of the mills, and to the textile industry in southern public opinion and policy.

Katharine Jocher has published during the year:

An Introduction to Social Research. (With Howard W. Odum.) Henry Holt.

The Case Method in Social Research. *Social Forces*, December, 1928.

Dr. Jocher (with Howard W. Odum) is undertaking certain tasks of analysis and synthesis of folk sociology.

Guy B. Johnson has published the following during the year:

John Henry: Tracking Down a Negro Legend. The story of the origin and growth of a legend, with various John Henry ballads, work songs, and stories. The University of North Carolina Press.

Ambrose Gonzales. A biographical sketch of the late editor of the Columbia, South Carolina, *State*. Prepared for the *Dictionary of American Biography*.

In connection with the study of Negro culture on Saint Helena Island, South Carolina, Dr. Johnson has completed his researches in *Gullah: The Dialect of the Negroes of the Sea Islands*.

He has the following in preparation:

Folklore of Saint Helena Island, South Carolina.

Folkways and Customs of the Negroes of Saint Helena Island, South Carolina.

Folk Songs of Saint Helena Island, South Carolina, with a note on the relation of African and western music.

GUION GRIFFIS JOHNSON has published during the year:

The Ante-Bellum Town in North Carolina. *The North Carolina Historical Review*, October, 1928.

Recreational and Cultural Activities in the Ante-Bellum Town of North Carolina. *The North Carolina Historical Review*, January, 1929.

Social Characteristics of Ante-Bellum North Carolina. *The North Carolina Historical Review*, April, 1929.

She has continued her special researches in the social history of Saint Helena Island, South Carolina, to 1870. Data for this project have been collected and the MS is ready for publication.

DR. JOHNSON has in preparation:

A Social History of North Carolina, 1800-1860. All material on this project has been collected and about three-fourths of the MS written.

Social History of the American Family. Collection of data for this project has been started.

RUPERT B. VANCE has published during the year:

Human Factors in Cotton Culture: A Study in the Social Geography of the American South. The University of North Carolina Press.

Stuart-Harmon: Social Distance in Twin Towns. Chapter XI in Jesse F. Steiner, *The American Community in Action*. Henry Holt, New York, 1928.

Cotton Culture and its Influence on Southern Life and Institutions. Read at twenty-third annual meeting American Sociological Society, December 30, 1928. Published in the *Proceedings*, Volume XXIII.

DR. VANCE has under way a study in human geography of the South in which the South will be studied as a natural region and a culture area.

Detailed studies of population, topography, plants and animals, forestry, soil, and social geography of southern agriculture, livestock and dairying, transportation and communication, demography, diet and nutrition, climate in its relation to energy, health, work, and southern culture are some of the factors to be included. Of the three years' work for the completion of the first volume, one year has been devoted to effective beginnings.

Cecil K. Brown has under way a study of the history and development of the state highway system of North Carolina.

The project will be developed from the standpoint of the extent and nature of the road system and its relationship to the railroad as a means of transportation; the type of roads built; the administrative unit of control; methods of finance; methods of construction and maintenance.

E. C. Branson and his field assistant, Edward A. Terry, have continued their detailed examination of County Government and County Affairs in North Carolina.

Analyses of county expenditures and practices, largely by an intensive study of courthouse records in selected counties of the state, have been in progress for five years. The counties surveyed to date are: Alamance, Alleghany, Ashe, Beaufort, Bertie, Brunswick, Burke, Cabarrus, Caldwell, Camden, Carteret, Catawba, Cherokee, Chowan, Clay, Craven, Cumberland, Davie, Duplin, Edgecombe, Franklin, Gates, Greene, Halifax, Harnett, Haywood, Hoke, Hyde, Jackson, Johnston, Lee, Macon, Madison, McDowell, Mitchell, Montgomery, Moore, Nash, New Hanover, Northampton, Orange, Pamlico, Perquimans, Person, Pitt, Polk, Randolph, Robeson, Rutherford, Sampson, Scotland, Stanly, Stokes, Surry, Union, Washington, Watauga, Wilson, Yadkin.

Mary Phlegar Smith has published during the year:

Legal and Administrative Restrictions Affecting the Rights of Married Women to Work. *Annals of the American Academy of Political and Social Science,* May, 1929.

Under the direction of Edward J. Woodhouse, she has under way a project on the development of municipal life in North Carolina, a study of the growth of municipalities and their changing functions, from the colonial period to the present date.

Clifton J. Bradley assisted in gathering and compiling data for the North Carolina State Tax Commission's reports to the 1929 General Assembly.

Mr. Bradley is continuing the comprehensive studies of the southern coöperative movement.

He is studying the general economic and social aspects of coöperation with special reference to community organization and adult education. Specialists in economics and sociology are assisting in the direction of the study. The major attack is being made through the utilization of a rare mass of concrete data available from the five-year effort to teach coöperative marketing and community spirit among tobacco farmers of the Carolinas and Virginia.

JULIA C. SPRUILL, under the direction of R. D. W. CONNOR, has continued her comprehensive study of the changing attitude toward women in the South.

The collection of data for the first volume on the woman of the ante-bellum South has practically been completed and this volume will be written during the coming year.

Under the direction of M. R. TRABUE, GUSTAVE E. METZ has made an investigation of the vocational ambitions of North Carolina high school pupils.

The object of the study is to determine the need for a vocational guidance program in the high schools of North Carolina.

GRAHAM B. DIMMICK, under the direction of A. M. JORDAN, has been making an investigation to determine the mental and physical status and growth of a particular vocational group for the purpose of making comparisons with other vocational groups previously studied.

A previous investigation included a study of mill village and non-mill village children, whereas the present study has been concerned with children of farmers and tenant farmers. In addition, the attempt has been made to determine quantitatively the amount of one species of deceptive behavior—cheating—exhibited by members of this vocational group in comparison with the same behavior exhibited by other vocational groups.

(See also statements in the several departments of social science.)

RESEARCH IN ORGANIZATIONS

THE ELISHA MITCHELL SCIENTIFIC SOCIETY

306TH MEETING, OCTOBER 9, 1928

H. V. WILSON. Some Guiding Ideas in Biology.

Three biological ideas may be adduced that have stood the wear and tear of time and may be looked on as solidly based generalizations. These are (1) the cell-theory; (2) the gradational arrangement of forms in series, seen everywhere in animal and plant groups, leading from lower or more generalized to more specialized types; (3) embryonic recapitulation, in higher or more specialized forms, of types of structure that are permanent and characteristic in lower or more generalized forms. All of these generalizations are continually being verified by the discovery, to which their employment leads, of more and more particular cases which conform to the rule.

The relation to the evolution theory of the recapitulation process and the serial arrangement of forms is close. The evolution theory, as an account of genetic changes in animals and plants during the ages preceding our own, is an inference or deduction drawn from generalizations. The deduction is so obvious and the supporting generalizations so diverse and so rich in content that, in the absence of any other explanation, save transcendental ones of the observable facts, our conclusion acquires such a high degree of probability that we are constrained to believe in its truth. And yet even here, if we care for logic, we recognize that observable fact and generalization take precedence in our classification of knowledge over deductions, no matter how strong.

In contrast to well-established generalizations, such as those that have been adduced, is the theory of self-adaptation. We apply this term to cases where in the developing germ or the injured adult a new type of behavior is called out by a set of conditions which make the usual, normal behavior impossible. The behavior is so "regulated" that the end result, although reached in new ways, is the same as in normal life. We now know many phenomena, especially of a regenerative nature, which seem to be due to the working of this power of self-adaptation. W. Roux and H. Driesch regard it as among the primary powers of protoplasm. Perhaps, as we continue to test out the idea, we shall find that we are dealing with a real process and have not been misled by superficial analogies into considering a mass of phenomena as homogeneous which later investigation will have analyzed into groups due to different and distinct causes. Biologists at any rate are better disposed toward it than formerly, since so many have learned, what was plain decades ago to others like W. K. Brooks, that science is at bottom descriptive and that the chemico-physical structure and processes of a protoplasmic mass (cell, tissue, organ, organism), no matter how important they are for us to ascertain, will not tell us what it will do or can do as a whole. And still that is what, as biologists,

we are chiefly concerned with, rather than with the subsidiary processes of oxidation, electrical change, and the like, processes strictly within the field of the chemist and physicist, who yet are guided to their study by the discoveries of the biologist. How a protoplasmic mass correlates the elementary physico-chemical processes so as to develop or otherwise function in a particular way, we have as yet no idea. The power is a part of the organization of the mass, we say. We discover it through observation, including under that head experiment, and in no other way.

For the present we may content ourselves with recognizing that self-adaptation is a lively and fruitful idea in the investigations of today. Quite possibly we have here a generalization in its most interesting phase—that is, an incipient one.

F. K. CAMERON and H. D. CROCKFORD. The Aqueous Solution of Cupric and Ferrous Sulphates.

The solution isotherms at 30° C. have been plotted for the several systems involved, and the corresponding solid phases identified. Among the necessary consequences one must include:

1. The solubility of cupric sulphate in water is depressed by sulphuric acid.
2. The solubility of ferrous sulphate is depressed by sulphuric acid.
3. Cupric sulphate and ferrous sulphate mutually depress one another's solubility in water. The presence of sulphuric acid augments the depression.
4. A satisfactory explanation of the two solid phases in contact with an aqueous solution of cupric sulphate, ferrous sulphate, and sulphuric acid is that one phase is cupric sulphate pentahydrate, $Cu\,So_4\,5\,H_2O$, and the other a solid solution of ferrous sulphate, sulphuric acid, and water.

307TH MEETING, NOVEMBER 13, 1928

T. F. HICKERSON. An Exact Method for the Design of Continuous Beams and Columns.

W. C. COKER. The Flora of North Carolina.

No recent list of North Carolina plants has been published. In 1822 Schweinitz published a synopsis of the fungi of North Carolina, the first important work on fungi to be issued in America. In 1869 Curtis brought out his *Catalog of the Indigenous and Naturalized Plants of the State.* In this he includes a total of 4,849 plants, of which 1,873 were flowering plants; the remainder, 2,976, lower plants. In 1899 C. W. Hyams *(The Flora of North Carolina from Ranunculaceae to Salviniaceae)* listed the flowering plants and ferns (with their allies), giving a total of 2,685, of which 2,622 are flowering plants. No general list has appeared since. To the aforementioned list, after subtracting some obvious errors, we have appended known additions to the flora and now have a list totaling about 5,500, of which about 2,800 are flowering plants. In this list we include only the fungi listed by Curtis, but within the last fifteen years our Botanical Department here at the University

has added many fungi to the state. We have not yet taken the time to add them up.

Compared with other states, the flora of North Carolina is extremely rich. From the evidence available, only Florida seems to lead this state in the total number of flowering plants and fern allies. Dr. Small, of the New York Botanical Garden, estimates the number in Florida as 3,610 (3,500 and 110, respectively). Mr. E. J. Alexander, one of our former students, now at the New York Botanical Garden, estimates the flowering plants of this state as 3,100, and ferns (with allies) 68, or a total of 3,168. If this estimate is correct, we lead all states except Florida, so far as published information is concerned.

On account of the importance and special interest in trees, we note that Florida has 328, North Carolina 199, Texas 198, Louisiana 196, Pennsylvania 189, Alabama 136, Georgia 134, Indiana 127, West Virginia 125, California 94. It should be mentioned, however, that comparison by exact numbers is impossible, as different authors treat the subject differently and as some include as trees plants that others list as shrubs. Judgment as to species and varieties also varies greatly.

308TH MEETING, DECEMBER 11, 1928

OTTO STUHLMAN. The Physical Characteristics of Kunzite and Hiddenite.

G. R. MACCARTHY. Unstable Continents.

309TH MEETING, JANUARY 15, 1929

H. D. CROCKFORD (with L. E. WARRICK). The System $CuSO_4$-H_2SO_4-H_2O.

The system: cupric sulphate, sulphuric acid, and water has been investigated at 0°, 30°, and 40° C. The following conclusions have been established.

1. The solubility of cupric sulphate is depressed by the presence of sulphuric acid.

2. The solubility of cupric sulphate in sulphuric acid solutions increases with rise of temperature.

3. The solid phases found in this system are: cupric sulphate pentahydrate, cupric sulphate trihydrate, cupric sulphate monohydrate and anhydrous cupric sulphate. The amount of water of crystallization decreases with increase in the concentration of sulphuric acid.

4. The data of Bell and Tabor,[1] and Foote,[2] for this system at 25 C. have been confirmed.

H. H. WILLIAMS. The Third Problem in Logic; the Transition from Law to Truth.

[1] Bell and Tabor, *J. Phys. Chem.*, XII: 175. 1908.
[2] Foote, *J. Amer. Chem. Soc.*, XXXVII: 290. 1915.

310TH MEETING, FEBRUARY 12, 1929

H. W. CRANE. The Use of the Motion Picture in Clinical Studies. (Illustrated.)

R. W. BOST. Tin Tetraphenyl—A New Reagent in Organic Syntheses.

Reactions between tin tetraphenyl and the following compounds were studied: halogens, alkyl halides, acyl halides, sulfur, sulfuryl chloride, and nitric acid. With halogens monoaryl halides were formed. Alkyl halides react to give low yields of aromatic hydrocarbons, while acyl halides react to give ketones. Sulfur under different conditions of time of heating, temperature, and concentration of sulfur yields diphenyl sulfide, diphenyl disulfide, and thianthrene. Nitric acid reacts violently to give nitrobenzene. The reaction with sulfuryl chloride gives a variety of products.

311TH MEETING, MARCH 12, 1929

G. M. BRAUNE. Tests on the Yadkin River Bridge. (Illustrated.)

J. F. DASHIELL. Effect of Emotional Excitement upon Rational Behavior.

For abstract see pp. 74-75.

312TH MEETING, APRIL 16, 1929

ARCHIBALD HENDERSON. Einstein.

D. A. MCPHERSON. Hideyo Noguchi—Martyr to Science.

313TH MEETING, MAY 14, 1929

H. V. WILSON and J. T. PENNEY. The Regeneration of the Epidermis in Sponges Grown from Dissociated Cells.

The epidermis of the adult sponge, *Microciona prolifera*, is a continuous sheet of protoplasm which is devoid of cell outlines and in which the nuclei are irregularly scattered. The mesenchyme is composed of eight different types of cells which are recognizable by their nuclei and inclusions. The bulk of the dissociated tissue and of the early reunition masses is made up of two of these types of mesenchyme cells and of collar cells.

The epidermis of the sponges grown from dissociated cells is formed from mesenchyme cells of a particular type. These cells form a layer at the surface of the early reunition mass. They flatten out, become continuous with one another, and eventually form a thin film in which the inclusions typical of the cells taking part in this formation are arranged in a single layer. These inclusions disappear and the film assumes the adult condition.

W. M. MEBANE. The Solubility of the Phosphates of Calcium in Aqueous Solutions of Sulphur Dioxide.

Collier Cobb. Cliff and Cave Dwellings and Petroglyphs Along the Tuckasegee, Little Tennessee, and Nantahala Rivers in North Carolina.

Abstract appears on p. 57.

A Small Fossil Elephant from the Everglades of Florida. (Exhibit of the bones.)

THE PHILOLOGICAL CLUB

October 2, 1928—U. T. Holmes. Cligès and Germany.

The *Cligès* of Cretien de Troyes shows an unusual interest in Germany and things German. As the date of this poem is in doubt, it might be assigned to the year 1162 when Frederick Barbarossa and Count Henry of Frayes (Cretien's patron) were actually allied against Louis VII of France.

November 6, 1928—G. C. Taylor. The Dialogues of the Weeping and the Laughing Philosophers and the *Merchant of Venice.*

Suggestion of the possible connection between three dialogues and the *Merchant of Venice.* Act I, scene 1.

December 4, 1928—J. C. Lyons. The *Littérature de Colportage* in the French Renaissance.

An estimate of the popularity and influence of chap-books in the first half of the sixteenth century. They were for the most part reworkings of the old romances and folk legends. They were an important source for Rabelais and other *conteurs* of the period.

R. R. Potter. Dog-stars and the Bow-wow Drama.

An informal discussion of dog-actors and dog-melodrama popular on the London stage during the last century.

January 14, 1929—Norman Foerster. Literary Scholarship in an Age of Science.

Published under the title "The American Scholar: A Study in *Litterae Inhumaniores*" by the University of North Carolina Press. (See pp. 45-46 for abstract.)

February 5, 1929—Joint meeting in Durham with the Erasmus Club of Duke University.

F. A. C. Cowper. Provins and the *Eracle* of Gautier d' Arras.

Provins was the chief residence of Henry the Liberal, patron of Crétien de Troyes. It was a center for the wool trade in France, and many fairs

flourished in connection with it. The descriptions in the *Eracle* are surely reminiscent of Provins and its fairs.

H. M. JONES. The Disreputable Century.

Current interpretations of the nineteenth century, both popular and in some cases scholarly, are uniformly disparaging. Some interpreters find in the literature of the romantic period and the nineteenth century the theoretical source of most of the false thinking and false conduct of which they complain in their own times. Others allege that the nineteenth century established a rigid and pharisaical system of conduct which it is our present task to break down. An examination of the facts indicates that the leaders of Victorian thought and literature were frequently engaged in breaking down a system of bourgeois ideals inherited from the eighteenth century; and that, whatever the weaknesses of romantic literature, its greatest contribution to the modern world was its emphasis upon man as a political being, charged with responsibility for a humanitarian amelioration of social life. The paper concludes with a plan for a valuation of nineteenth-century thinking free from dogmatic bias.

March 5, 1929—J. F. ROYSTER. The Title Page of *Love's Labour's Lost.*

A discussion of the importance of detailed study of the title pages of quarto copies of Elizabethan plays as a means of determining data concerning occasions of presentation, companies, dates, etc., with a suggestion as to the date of *Love's Labour's Lost.*

April 2, 1929—T. J. WILSON III. La Calprenède's Use of History in the Novel *Cassandre.*

Gautier de Costes de la Calprenède (1609?-1663), *précieux* novelist and playwright, was particularly fond of historical material as subject matter for the novel. In his first novel, *Cassandre* (10 Volumes in-8, 1642-1645), he uses the history of Alexander the Great as a source for his main plot and for most of his sub-plots, and as a source for what he considered picturesque atmosphere. He desired *Cassandre* to be regarded as historically exact and true, and put forth great efforts to achieve this end; but these efforts were of no avail because of his distortion of historical fact and character, distortion caused by his subservience to the *précieux* public which abhorred realism and demanded idealism and sentimentality in all things, especially love, which was the principal matter of his novel.

May 7, 1929—M. L. RADOFF. The Critical Theory of Marcel Proust.

A discussion of Proust's attitude toward literary composition, and the application of his theories to his own works.

May 7, 1929—J. P. HARLAND. A Survey of the Helladic Civilization of Greece.

Survey of the Helladic Civilization (the civilization that developed in the mainland of Greece in the Bronze Age, *ca.* 3000-1100 B.C.).

In the early period, a non-Indo-European people inhabited the mainland and their civilization was brought to a sudden end by the invasion of the first of Hellenic stock who reached a high state of culture around 1600 B.C. *Ca.* 1400 another wave entered and built the great walls, palaces, and tombs. The Dorian invasion, *ca.* 1100 B.C., brought an end to the Bronze Age.

SOCIETY OF THE SIGMA XI

The University of North Carolina Chapter of the Society of the Sigma Xi (the Society for the Promotion of Research) was the first and, until recently, the only chapter of the Society in the South. Two general meetings, to which were invited members of the Society resident in other institutions, have been held during the past year. During the year five active members and twenty-four associates were elected. In addition, one active member of another chapter became affiliated with this chapter. At the commencement meeting of the chapter the new members were initiated. Following the initiation, Dr. William deB. MacNider, Kenan Research Professor of Pharmacology in the University, gave a very interesting talk on certain phases of his studies on the effect of toxic substances on the kidney.

The annual Sigma Xi lectures were delivered on April 12 and 13 by Dr. W. J. Humphreys, Meteorological Physicist of the U. S. Weather Bureau, Washington, D. C., in the main auditorium of Phillips Hall. The first lecture, entitled, "The Air and its Ways," dealt with the origin of the atmosphere, the discoveries of its known constituents, the relative amounts of these elements and the rôles they play, the physical state of the air at all levels, and how and why the wind blows and storms are formed. The second lecture, entitled "Fogs and Clouds," discussed the formation of and classification of fogs and clouds and certain of their associated phenomena—lightning, corona, and rainbow. Both lectures were abundantly illustrated with lantern slides.

RESEARCH PUBLICATIONS

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No. 1, September, 1928

Proceedings of the Twenty-seventh Annual Meeting of the North Carolina Academy of Science.

Constitution of the North Carolina Academy of Science.

Proceedings of the Elisha Mitchell Scientific Society for the Year 1927-1928.

Some Approaches to Fundamental Theory of the Physical Sciences. *J. M. Bell.*

Some Effects of the Injection of Pituitrin into Hens' Eggs. *Bert Cunningham* and *W. Stanfield.*

Two New Terrapins of the Genus Pseudemys from the Southern States. *C. S. Brimley.*

Quality of the Surface Waters of North Carolina. *E. E. Randolph.*

Spore-forming, Gas-producing Aerobes in Water. *Roy J. Campbell.*

Cell Behavior in the Regeneration of Sponges from Dissociated Cells. *H. V. Wilson* and *J. T. Penney.*

Interspecific Grafting, Using Sponge Cells. *M. W. de Laubenfels.*

Iodine in North Carolina Public Water Supplies. *J. W. Perry.*

Abnormal Embryos of Oats and Wheat. *Lucile Sharp.*

Flora of the Tryon Region of North and South Carolina. Part 1. *Donald Culross Peattie.*

Observations on *Amoebidium parasiticum* Cienkowski. *Wm. Randolph Taylor.*

Studies on the Frequency of Water Molds in the Soil. *Kenneth B. Raper.*

No. 2, April, 1929

Flora of the Tryon Region. Parts II and III. *Donald Culross Peattie.*

The Ecology of Certain Estuarine Crabs at Beaufort, N. C. *A. S. Pearse.*

A New Pyxie from North Carolina. *B. W. Wells.*

Some Rare or New Protozoa. *Bert Cunningham.*

A Monograph of Septobasidium. Part I. Jamaican Species. *J. N. Couch.*

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STUDIES IN PHILOLOGY

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Kuhl, Ernest P. Shakespeare and Hayward.

Bond, Richmond P. Some Eighteenth-Century Chaucer Allusions.

MacMillan, Dougald. Planché's Early Classical Burlesques.

McCutcheon, Roger P. John Dunton's Connection with Book Reviewing.

Mott, Frank Luther. A Brief History of *Graham's Magazine.*

Sturtevant, Albert Morey. Some Vowel Variations in Certain Old Norse Words.

Canter, H. V. Personal Appearance in the Biography of the Roman Emperors.

VOLUME XXV, 4—October, 1928

Snyder, Franklyn Bliss. Burns and His Biographers.

Williamson, George. The Nature of the Donne Tradition.

Knowlton, E. C. The Genii of Spenser.

Martin, Burns. The Date of Milton's First Marriage.

Hughes, Helen Sard. Pope to Lord Bathurst: An Unpublished Letter.

Parrott, Alice. A Critical Bibliography of Spenser from 1923-1928.

Marsh, George L. The Writings of Keats' Friend Reynolds.

VOLUME XXVI, 1—January, 1929

Clark, Harry Hayden. What Made Freneau the Father of American Poetry?

Hotson, Clarence Paul. Emerson's Biographical Sources for *Swedenborg.*

Ware, Lois. Poetic Conventions in *Leaves of Grass.*

Adams, Raymond W. Thoreau and Immortality.

Gohdes, Clarence. The Western Messenger and *The Dial.*

Foerster, Norman. Wordsworth in America.

McDowell, Tremaine. The Juvenile Verse of William Cullen Bryant.

VOLUME XXVI, 2—April, 1929

Greenlaw, Edwin. Britomart at the House of Busirane.

Belden, H. M. Alanus de Insulis, Giles Fletcher, and the "Mutabilitie" Cantos.

Helsztynski, Stanilas. Milton in Poland.

Riley, Edgar H. Milton's Tribute to Vergil.

Sharpe, Robert Boies. "We Band of Brothers."

Kuhl, Ernest. "The Wanton Wife of Bath" and Essex.

Tannenbaum, S. A. Corrections in the Text of Parts I and II of the Parnassus Trilology.

Craig, Hardin. Recent Literature of the English Renaissance.

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Insurance Trusts—The Insurer as Trustee. *M. T. Van Hecke.*

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Appellate Practice and Procedure in North Carolina. *Frederick B. McCall.*
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Suggested Changes in North Carolina Civil Procedure. *Atwell Campbell McIntosh.*

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The Recovery of Damages for Loss of Expected Profits. *Charles T. McCormick.*
Restraint of Trade in North Carolina. *M. S. Breckenridge.*
The Supreme Court and Commerce by Motor Vehicle. *Charles P. Light, Jr.*

VOLUME VII, 4—June, 1929

A Survey of Recent Statutory Changes in North Carolina. *The Law Faculty, H. D. Wolf,* and *Clarence Heer.*
The "I'm Alone" Case and the Doctrine of "Hot Pursuit." *Keener C. Fraser.*
The Federal Courts and the Construction of Uniform State Laws. *J. B. Fordham.*

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Farmer Leaders in the United States. *Pitirim A. Sorokin* and *Carle C. Zimmerman.*
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VOLUME VII, 2, December, 1928

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Standards of Living and Planes of Living. *L. L. Bernard.*
The Case Method in Social Research. *Katharine Jocher.*
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Notes on "Timeless" Sociology. *Frederick J. Teggart* and *Floyd N. House.*

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VOLUME VII, 4, June, 1929

Some Further Progress in Common Thinking by Sociologists and Social Workers. *Maurice J. Karpf.*

The Second Annual Meeting of the Section on Sociology and Social Work of the American Sociological Society: A Critical Review. *Fay B. Karpf.*

Some Contributions of Sociological Theory to Social Work. *Earle Edward Eubank.*

Sociological Concepts in Use by Social Workers. *Thomas J. Riley.*

Sociological Concepts as an Aid to Social Work Analyses. *Pauline V. Young.*

The Limitations of a Conceptual Approach to the Applications of Sociology to Social Work. *Jesse F. Steiner.*

A Sociological Analysis of the Contents of 2,000 Case Records with Special Reference to the Treatment of Family Discord. *Ernest R. Mowrer.*

Some Techniques for the Treatment of Domestic Discord Used by Case Workers. *Elizabeth Dutcher.*

The Limitations of Domestic Discord Case Records for Research. *Dorothy C. Kahn.*

The Need for Standardization of Family Case Records for Research Purposes. *Frances E. Price.*

A Study of the Techniques of the Social Case Work Interview. *Joanna C. Colcord.*

Can Interviews Be Described Objectively? *Stuart A. Queen.*

The Personal Interview Studied by Means of Analysis and Experiment. *Walter V. Bingham.*

Is Prediction Feasible in Social Work? An Inquiry Based Upon a Sociological Study of Parole Records. *Ernest W. Burgess.*

Does Prediction Conflict with Individualization? *Lewis E. Lawes.*

Prediction—A Scientific Aid to Social Work. *Edwin J. Cooley.*

Some Inherent Difficulties in the Method of Prediction by Classification. *Stuart A. Rice.*

The Rôle of Sub-Classification in Statistical Analysis. *Robert W. Burgess.*

Methodological Significance and Limitations of Specific Statistical Methods. *E. H. Sutherland.*

A Study of the Attendance of the National Conference of Social Work, 1924-1927. *Howard R. Knight* and *Mary Louise Mark.*

The Relation of Social Work to Community Organization. *Walter W. Pettit.*

International Social Adjustments. *Robert C. Dexter.*